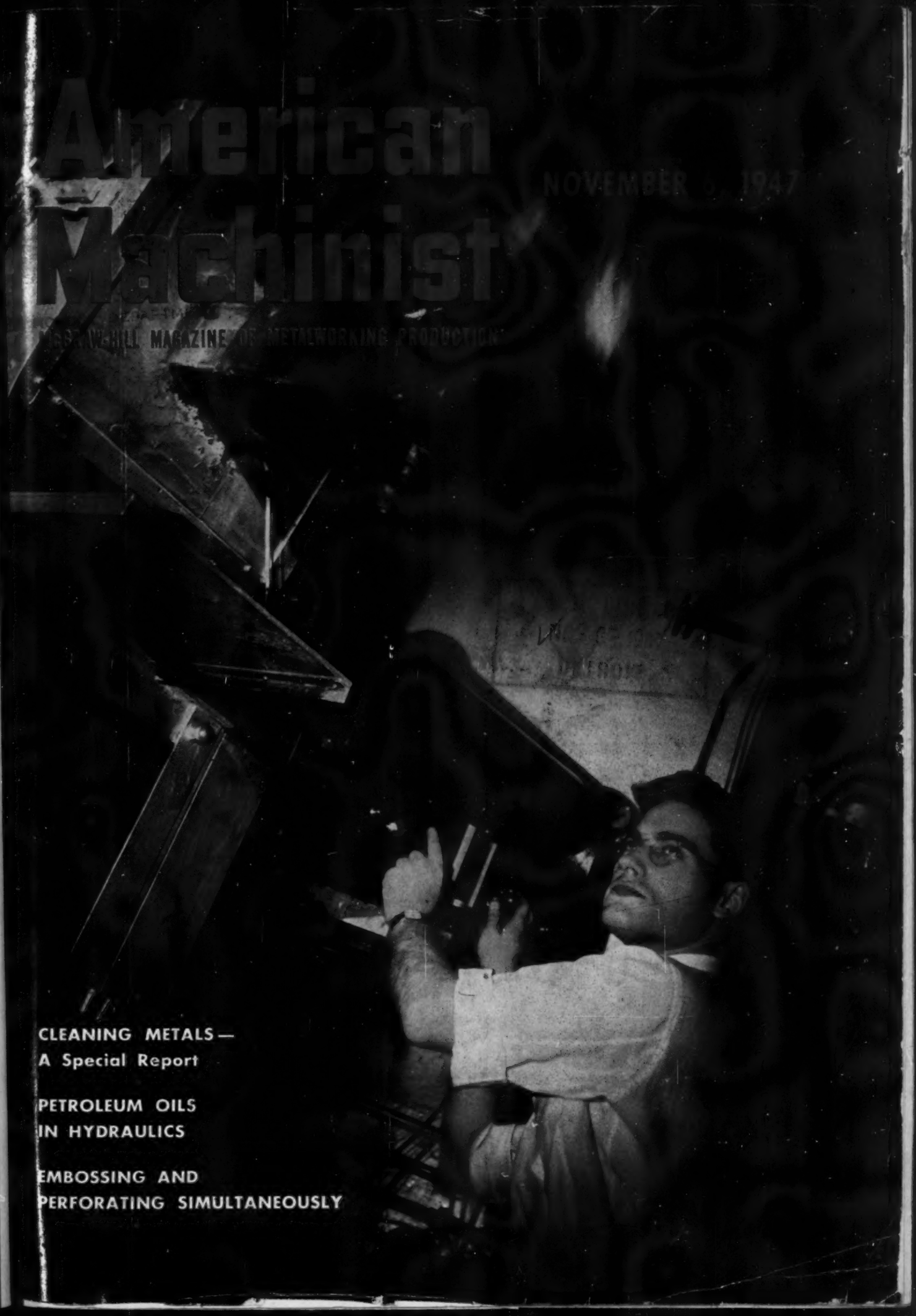
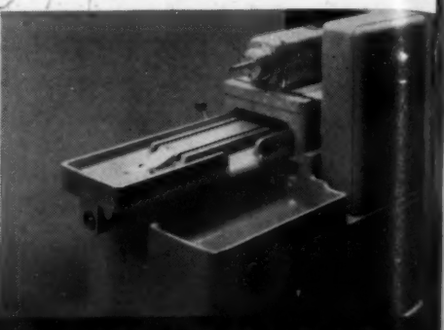

American
Machinist
NOVEMBER 6, 1947
CLEANING METALS—
A Special Report
PETROLEUM OILS
IN HYDRAULICS
EMBOSSING AND
PERFORATING SIMULTANEOUSLY

Compact design means simple operation

Centralized controls and easily adjusted table dogs

Complete power unit detachable from base



Large chip pan and built-in electrical control box

on the NEW SMALL HEALD BORE-MATICS

ANOTHER OF 18 NEW HEALD MACHINES

Single or double end high-precision machines for small work

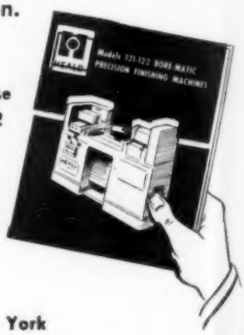
SMALL IN SIZE and simple in design, these new Bore-Matics are ideally suited to both large and small shops. They can be tooled for one or several parts to bore, face, turn, chamfer groove or fly cut — yet they operate very easily.

Among the features in design are: knee-hole construction; capacity for two spindles at each end; complete control of heat and vibration; permanently lubricated, cool-running boringheads; self-adjusting, quick acting brakes; leakproof hydraulic system — all of which require negligible maintenance.

These new, small Bore-Matics are extremely accurate, productive and efficient with —

EXTREMELY FAST OPERATING CYCLES — high table traverse speeds, and faster boringhead speeds.
UNIFORM SPEEDS AND FEEDS — *remain constant* throughout the day without adjustment.
TWO-WAY BORING — different rates of "in" and "out" feeds available.

Write Heald branch office nearest you for further information.



FREE BULLETIN on these new Heald No. 121 or 122 Bore-Matics lists complete features and specifications. Send for your copy today.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION

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Chips and QUIPS

Cover . . . T. H. Gray, Westinghouse Research Laboratories, adjusts an experimental controlled-atmosphere furnace to make our striking cover Kodachrome. The furnace is used for bright-hardening small gears, dies, punches and other steel parts which must be heat-treated without decarburization.

Cleaning Metals . . . A roundup of latest practice on cleaning methods for metals forms our special report in this issue. Associate Editor Wharen did his usual careful job of putting together ideas and procedures, compressed into 16 pages the essential data.

Synchronizing Feed . . . Joseph F. Budnick shows how air systems provide flexibility for synchronized dial feeds for small parts and controlling work at each station on a variety of machines. . . . For more on press feeds particularly, see *A.M.* for Nov. 20, which will include a special report by engineers of E. W. Bliss on "How to Feed Presses." (It includes ejectors too.)

Mr. Meanor's Misdemeanors . . . Acceptance of our guide to eating in Chicago surpassed our fondest hopes. We were forced to reprint for distribution by advertisers at the Safety and Metal Shows in the Windy City. A Milwaukee tool builder took a handful of copies back for his men who visit Chicago; Natco reprinted a half-size copy. We even had to stand in line at one of our own recommended eating places, ate amid crowds identified by Show badges at others. Also, rumor has it that Anson Meanor has complimentary meals lined up for days ahead.

Success with this venture from the beaten track suggests for the next Show a modified Emily Post code of etiquette. There'd be suggestions that the lady showgoer wear low heels and suit her makeup to the lighting, that exhibitors check the floor material before they unroll costly rugs and current material shortages before they select stock for demonstration and souvenirs, that show visitors be screened to skip "souvenir hunters" (euphemism for petty thieves who walk off with everything not wired down or behind glass) and smart guys who stick hands, circulars or other pointing devices into gears and cutters to test speed or motion or poke at signs to be sure they're substantial.

Production Tips . . . Arnold Ristow, supt. of the Electrical Control Dept., Allis-Chalmers, tells of two assembly-conveyor tricks. The first is an 80-ft. conveyor looped to save space, the second a turntable section in a roll conveyor which can be locked in desired position while work is done on any side of the carried assembly.

Ford has put in a new filter for grinder coolant, serving 100 grinders on aluminum pistons. The installation saved its cost in five months by avoiding expense, and labor in changing filter bags (once in 5-6 mo. instead of weekly), reclaiming machine oil, and avoiding the mess attendant on bag failure . . . Then there's fuel for the discussion of specialist or foreman to handle methods.

Tool Engineers, Attention! . . . Several tooling tricks in this issue include a very clever progressive die for forming special box-car runways, described by J. A. King . . . Then there's a fixture for odd-angle multiple planing developed at R. Hoe, and a Westinghouse report on incandescent-carbon brazing to make faster, stronger joints with less harm to insulation near the joint . . . Don't miss the regular installments of A. H. Waychoff's "Short Cuts," and of our Practical Ideas.

Coming . . . Nov. 20 *A.M.* will include a second installment of Mr. Zino's story on hydraulic oils, the special report on press feeds, a detailed user study of cast-alloy tools, their special strengths and applications . . . There's also a workable method for reducing occupational dermatitis, and the latest on effect of temperature on measurement of parts.

HYDRAULIC-OIL MAN . . . Anthony J. Zino, Jr., author of "Hydraulic Oils," has written for us a 7-part definitive study of petroleum oils in hydraulics, which starts in this issue. One after the other, it takes up the six vital factors in selecting hydraulic oils.

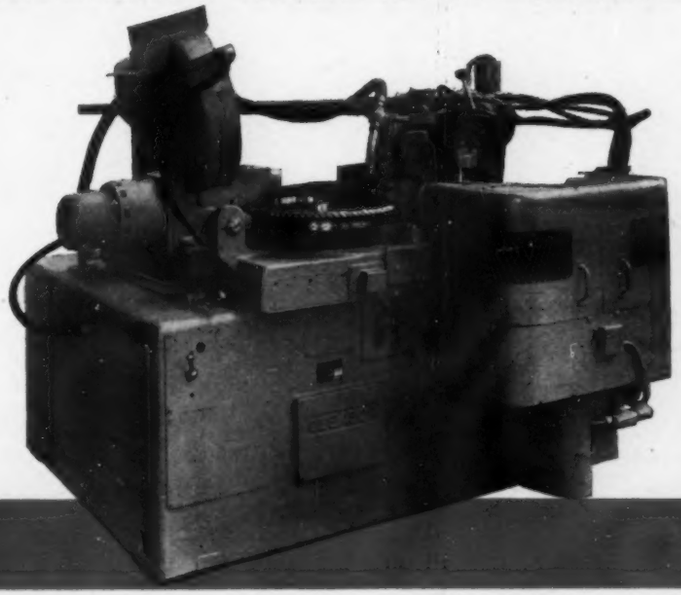
Mr. Zino got his B.S.Ch.E. from Cooper Union in '34, then did field research for Lubri-Zol Corp., Cleveland, on development of additives and treated oils. Included was two years in the industrial and marine fields around New York, so when E. F. Houghton absorbed Lubri-Zol's retail business in 1942, Mr. Zino became manager, Lubrication Dept., Eastern Div. Mr. Zino has just become asst. sales mgr., Industrial Div., Swan-Finch Oil Co. Mr. Zino helped organize the N. Y. section, Amer. Society of Lubricating Engineers, is currently chairman of this section and the national membership committee. He is also active in the SAE, Army Ordnance Assn., and on the ASTM Committee for compressor lubrication.

110 an hour cut from the solid

New . . . entirely automatic straight bevel gear cutting equipment for high quantity production . . . cutting from the solid . . . automatic loading . . . hydraulic chucking of work . . . one cutter carrying both roughing and finishing blades . . . burring is accomplished during cutting cycle . . .

GLEASON *No. 8 STRAIGHT BEVEL REVACYCLE MACHINE*

with AUTOMATIC LOADING *and* BURRING



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faster, at lower cost than has ever been practical with flame hardening

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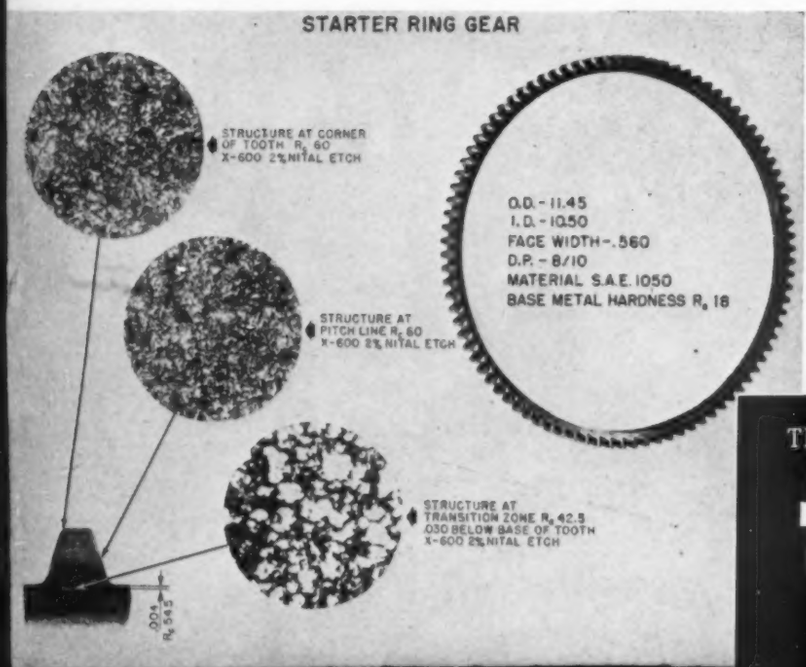
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STRUCTURE AT TRANSITION ZONE R. 42.5 .030 BELOW BASE OF TOOTH X-600 2% NITAL ETCH
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I.D. - 10.50
FACE WIDTH - .560
D.P. - 8/10
MATERIAL S.A.E. 1050
BASE METAL HARDNESS R. 18
.004 R. 54.5

this typical laboratory report

is proof of Flamatic performance. Full surface hardness is developed, depth of heat penetration is closely controlled, core properties are unaffected, and distortion is negligible. Other laboratory reports furnished on request.

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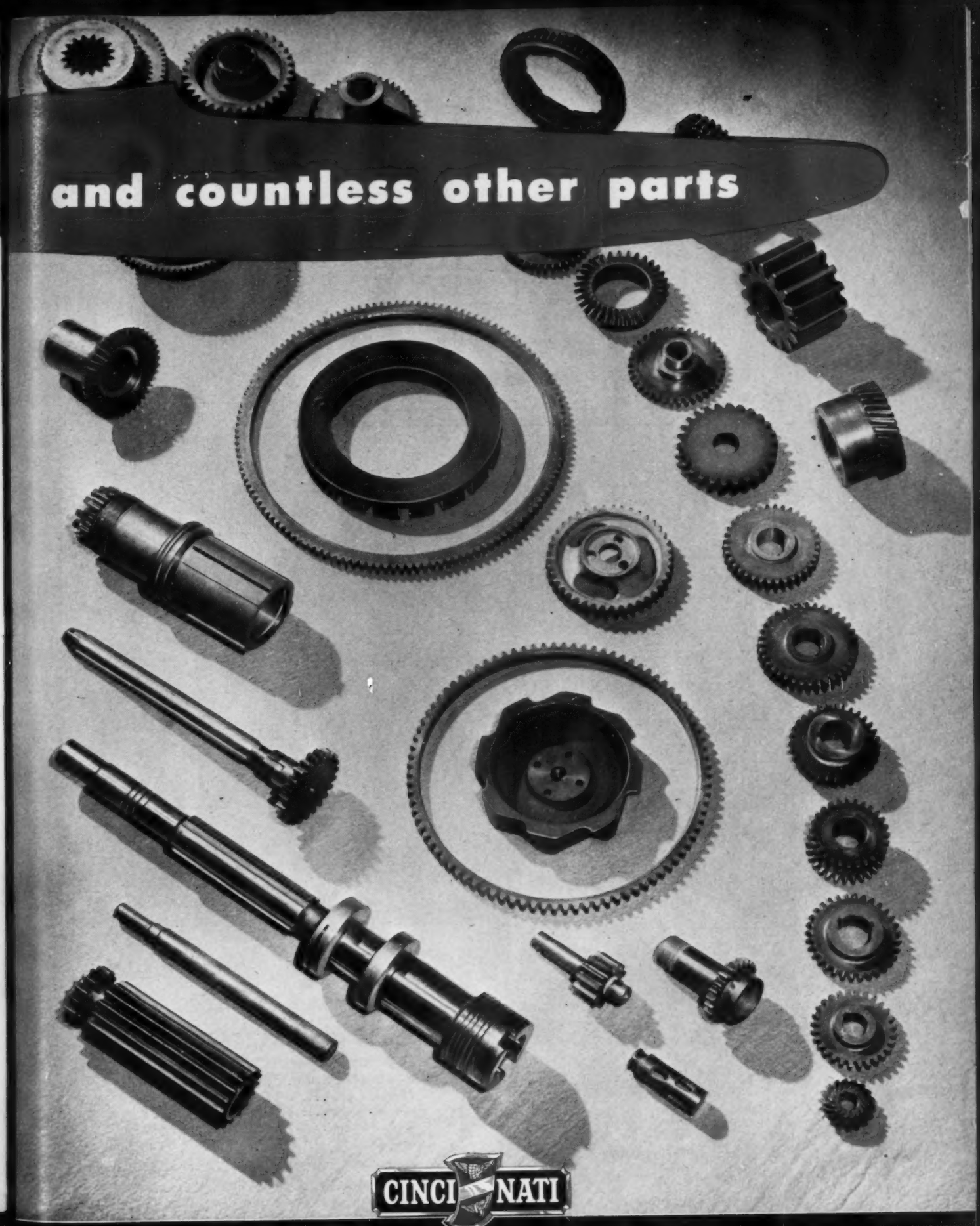
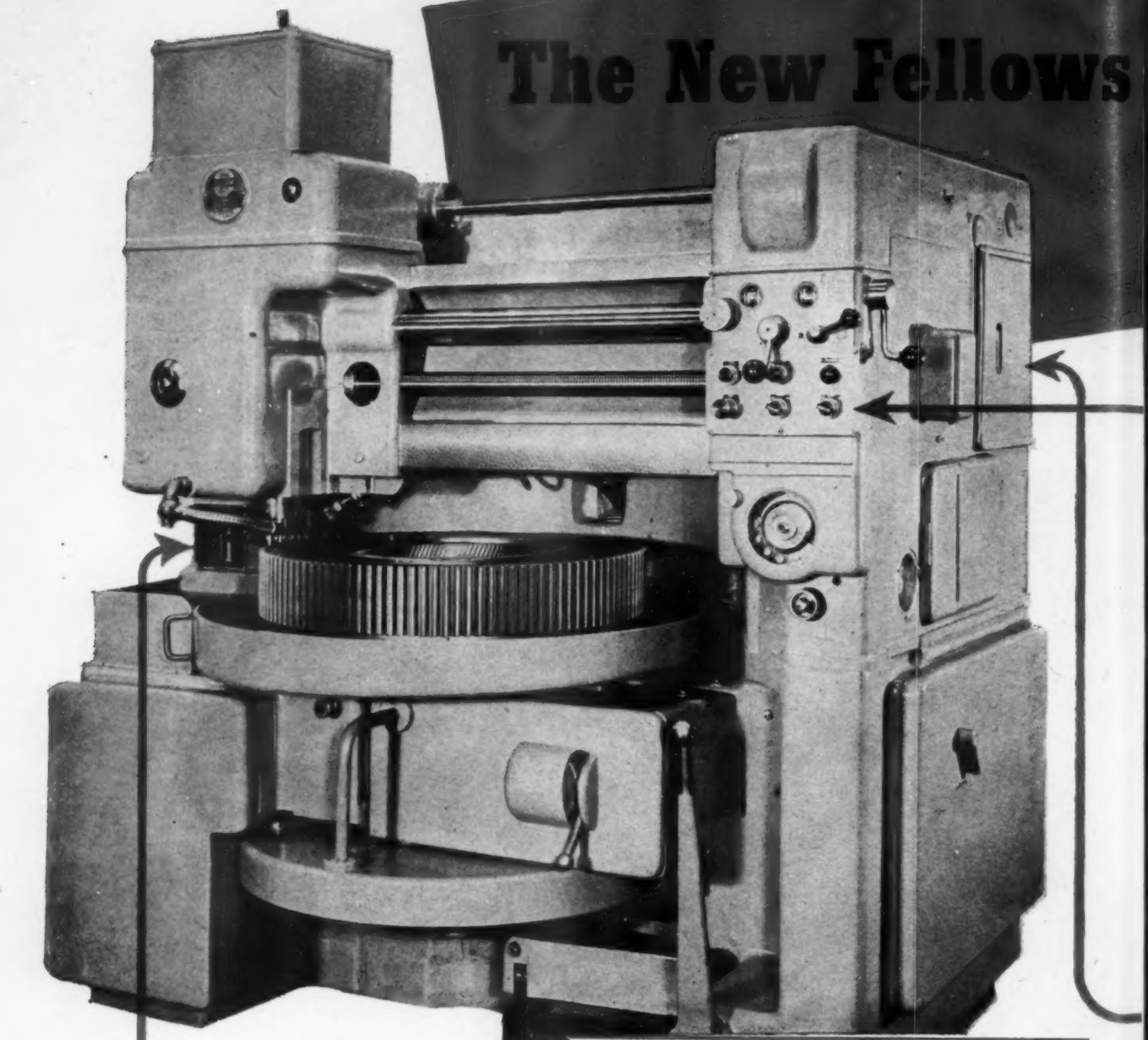
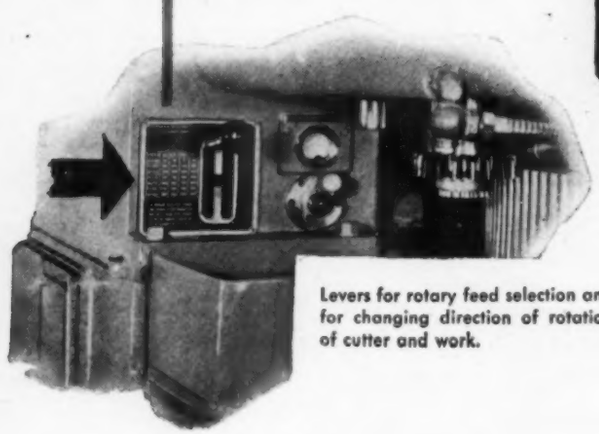


THE CINCINNATI MILLING MACHINE COMPANY

cincinnati 9, ohio, u.s.a.

The New Fellows





Levers for rotary feed selection and for changing direction of rotation of cutter and work.

PRINCIPAL SPECIFICATIONS

MAXIMUM CAPACITIES:

Pitch diameter (internal & external)	36 in.
Pitch Spur	3
Helical	4/5
Face width (internal & external)	5 in.
Helix angle (with standard guides)	45°

PRINCIPAL DIMENSIONS:

Overall depth	4 ft. 7½ in.
Overall length	6 ft. 2 in.
Overall height	7 ft.

WEIGHT:

Of machine (completely equipped) .... 12,400 lbs. approx.

STANDARD EQUIPMENT:

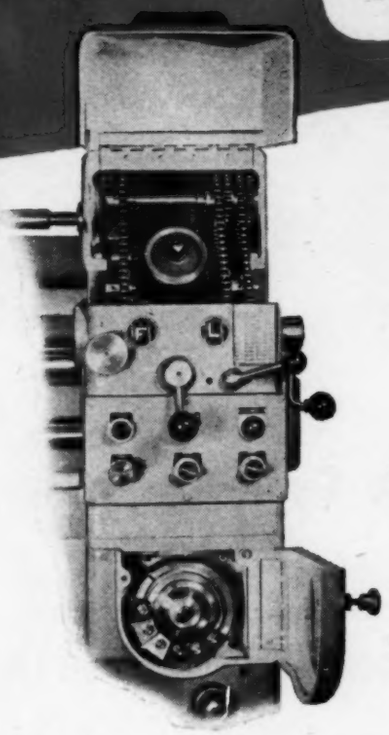
Lubricating pump and all connections; compound pump and integral motor, spur guide, change and feed gears to meet requirements.

SPECIAL EQUIPMENT:

Lubricating pump, machine motors, outfits, fixtures, cutters.

All-purpose 36" Gear Shaper

For Spur Gears • Helical Gears • Herringbone Gears • External Gears • Internal Gears Cluster Gears • Cams • Splines • Special Profiles



Quick selection of cutter speeds are grouped with "Start", "Jog" and "Stop" push buttons on this centralized control panel. Dial below controls setting for number of cuts.

• Quick-Selective Cutting Speeds

Operator can obtain twelve different cutter speeds up to 300 strokes per minute.

• Heavy Cuts at High Speed

This heavy-duty machine is equipped with a solid 4-inch cutter-spindle, and is of extremely rigid construction, permitting the taking of heavy cuts at high speed.

• Traditional Fellows Precision

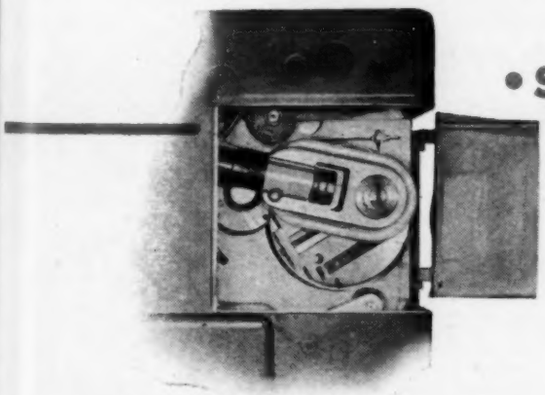
Operating on the generating principle with the inherent precision of Fellows cutters.

• Quick Set-up Flexibility

Work apron can be easily withdrawn for loading and unloading heavy gears. New type relieving mechanism and apron locking mechanism.

• Simple Operation

Feed and cutter speed set by dials at front of machine. Centralized push-button electrical control.

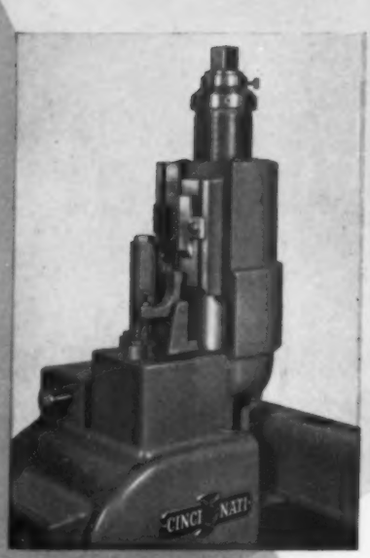


Crank mechanism, and stroke setting scale. Note rugged construction, typical of all operating members of this machine.

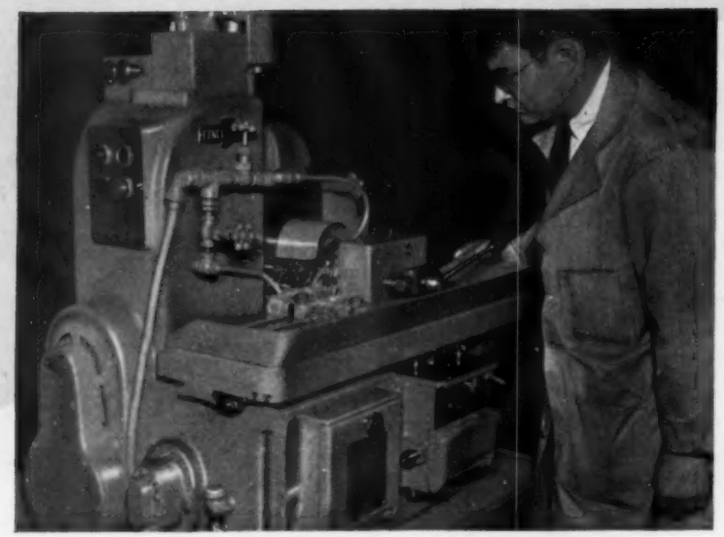
Every gear shop will want complete information on the new Fellows 36-inch Gear Shaper. Write: The Fellows Gear Shaper Company, Head Office and Export Dept., Springfield, Vermont. Branch Offices: 616 Fisher Bldg., Detroit 2, 640 West Town Office Bldg., Chicago 12, 7706 Empire State Bldg., New York 1.

Fellows

MACHINES AND TOOLS FOR ALL OPERATIONS FROM BLANK TO FINISHED GEAR



Mechanism for the hydraulic up and down motion of the spindle carrier; rapid at 80" per minute; feed down variable 1" to 10" per minute.



CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine with equipment and tooling for profile milling feed dogs.

This unit controls the sequence of events in the automatic cycle. Cycle selectors can be removed and replaced in a minute or less.

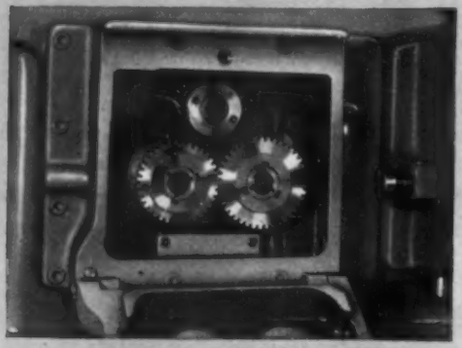


Table feed change gear station. No hand tools are required to change 16 feed rates, and the motor automatically stops when the cover is opened.

A New Cycle to Easier and Safer Production of Small Milled Parts

Get the jump on the next cycle of wage and material increases by starting your own cycle of cost reductions now. Small parts, manufactured in large quantities, offer attractive possibilities. For those requiring milling operations, the new CINCINNATI 0-8 Automatics will help you realize these possibilities. They have many features which promote rapid production, safety, and ease of operation. And you have a choice of three styles:

(1) Plain Automatic; (2) Automatic Rise and Fall;
(3) Automatic Profile Milling, of shapes up to 30° rise.

In all styles the complete cycle is automatic, started with one finger-tip lever. You may find out more about them by writing for catalog M-1607.

Climb, or Down Milling...

Built-in automatic backlash device enables your tool engineers to design the fixtures for up-milling or down-milling.

PC-334

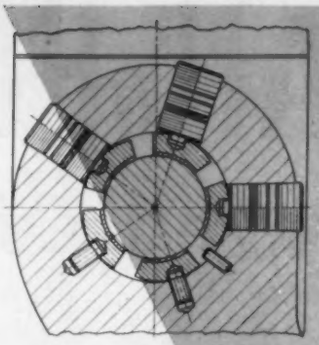
Conventional, or Up Milling...

CINCINNATI

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES

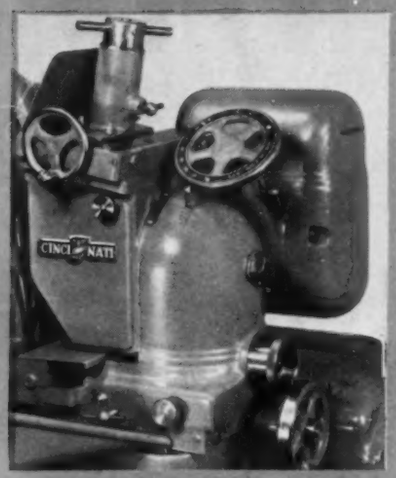


Cross-section through FILMATIC grinding wheel spindle bearings . . . the most valuable feature you can obtain in a grinding machine.

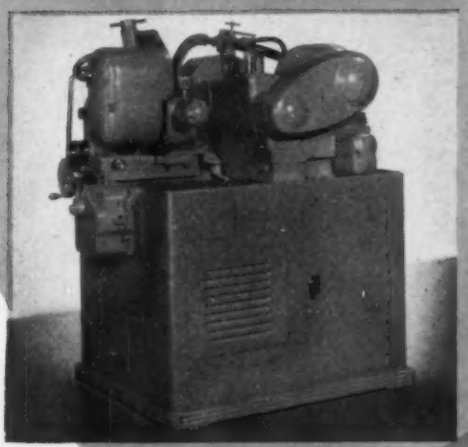
Now it's easier to reduce cost of small centerless ground parts

. . . ASSIGN THEM TO THE NEW FILMATIC NO. 0

Paint a barn with Junior's water color paint brushes? Unthinkable! But many shop costs may be just as much out of proportion for want of the right tools. Take small precision ground parts, for example; small enough to hold several dozen in your hand. CINCINNATI FILMATIC No. 0 Centerless Grinders were developed especially for work of that size. Powered at the grinding wheel by a 2 hp motor, they have a capacity of 0 to ½" diameter by 4" or 5" length, thrufeed and infeed, respectively. Several features of these new machines are illustrated here. Would you like to know more about them? Ask for catalog G-576.

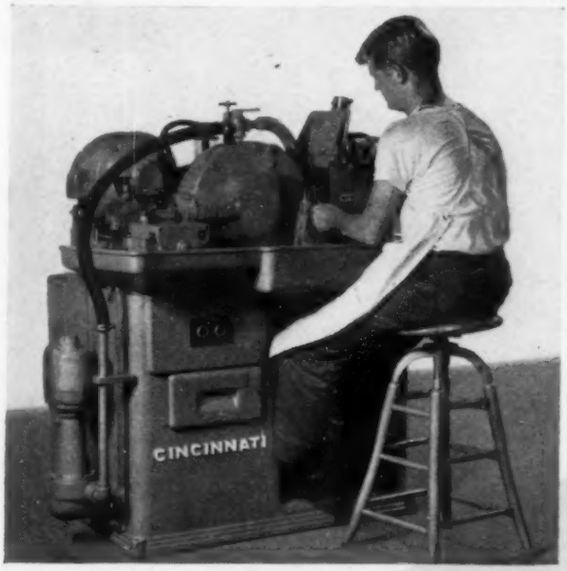


Regulating wheel unit . . . no gears to change; no levers to shift. Just rotate the handwheel to the speed desired.

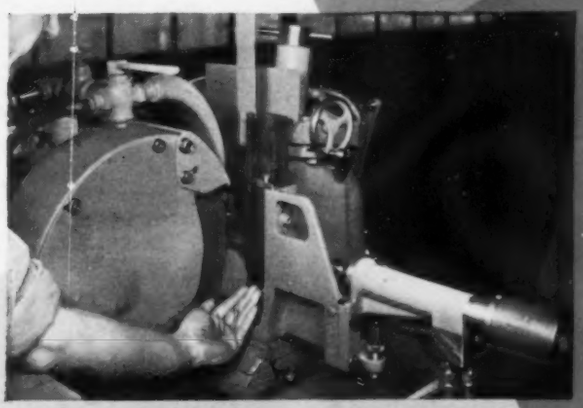


Rear view reveals smooth trim lines; built-in electrical equipment; floor space only 16 sq. ft.

FILMATIC



They're built for operators who like to work while seated.



Automatic loading fixtures may readily be applied. This equipment grinds No. 55 drills, five of which are in operator's hand.

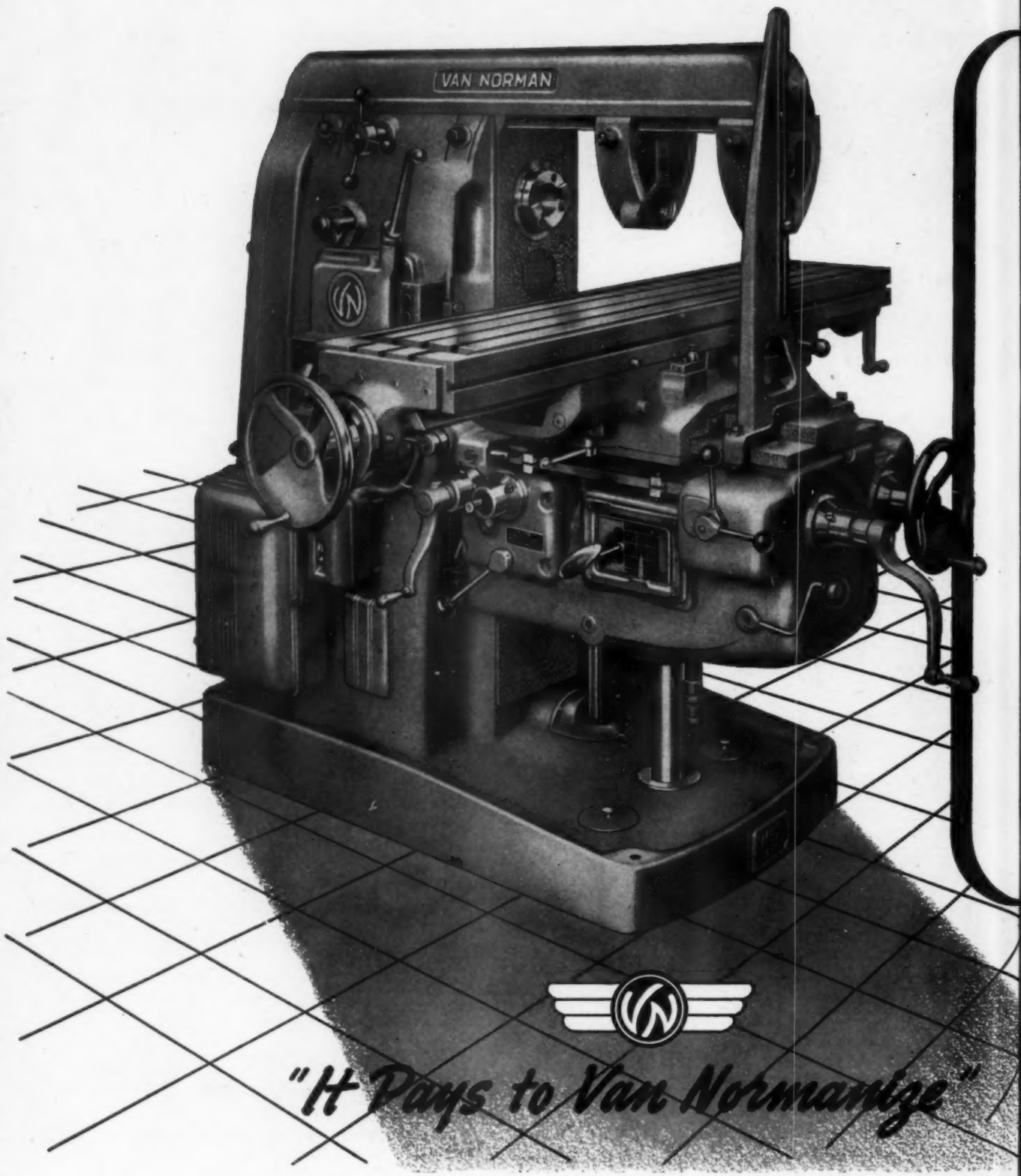
CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

VAN NORMAN HORIZONT

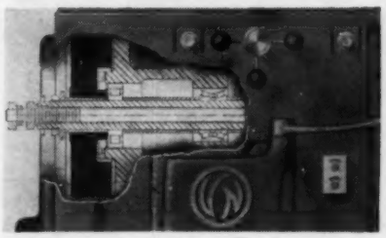
Provide Improved Cutability . . .



"It Pays to Van Normanize"

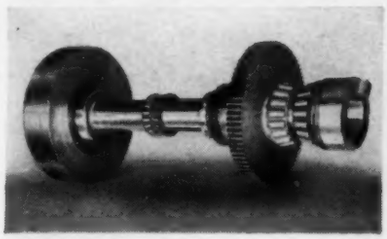
...NTAL MILLING MACHINES

... Exceptional Ease of Control



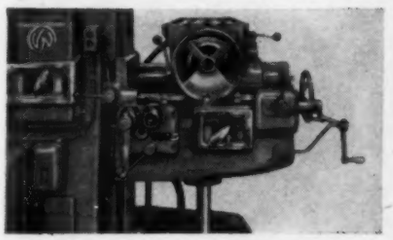
Built-in Spindle Flywheel

The Van Norman spindle design incorporates a heavy flywheel mounted inside the column. It assures uniform, uninterrupted transmission of power to the cutter because it effectually cushions by its inertia, any fluctuation of speed and power. The flywheel increases and improves cutability . . . results in a smooth finish of work surface.



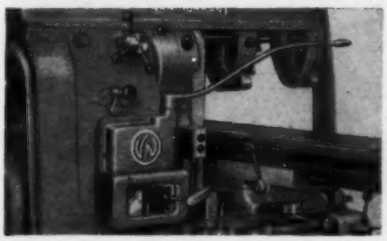
5-Bearing Spindle

The large diameter hardened alloy steel cutter spindle rotates on 5 anti-friction bearings. Large double-opposed taper roller bearings in front provide minimum overhang . . . center double-opposed taper roller bearings add rigidity. A straight roller bearing supports the rear. This construction assures maximum spindle support and rigidity under every type of cut.



Front & Rear Power Control

All power feed controls, as well as 6-way rapid traverse, can be operated from front or rear of the machine. This dual feed control simplifies operation, saves time, reduces worker fatigue. The finger tip controls are directional and can be operated either with spindle stopped or rotating.



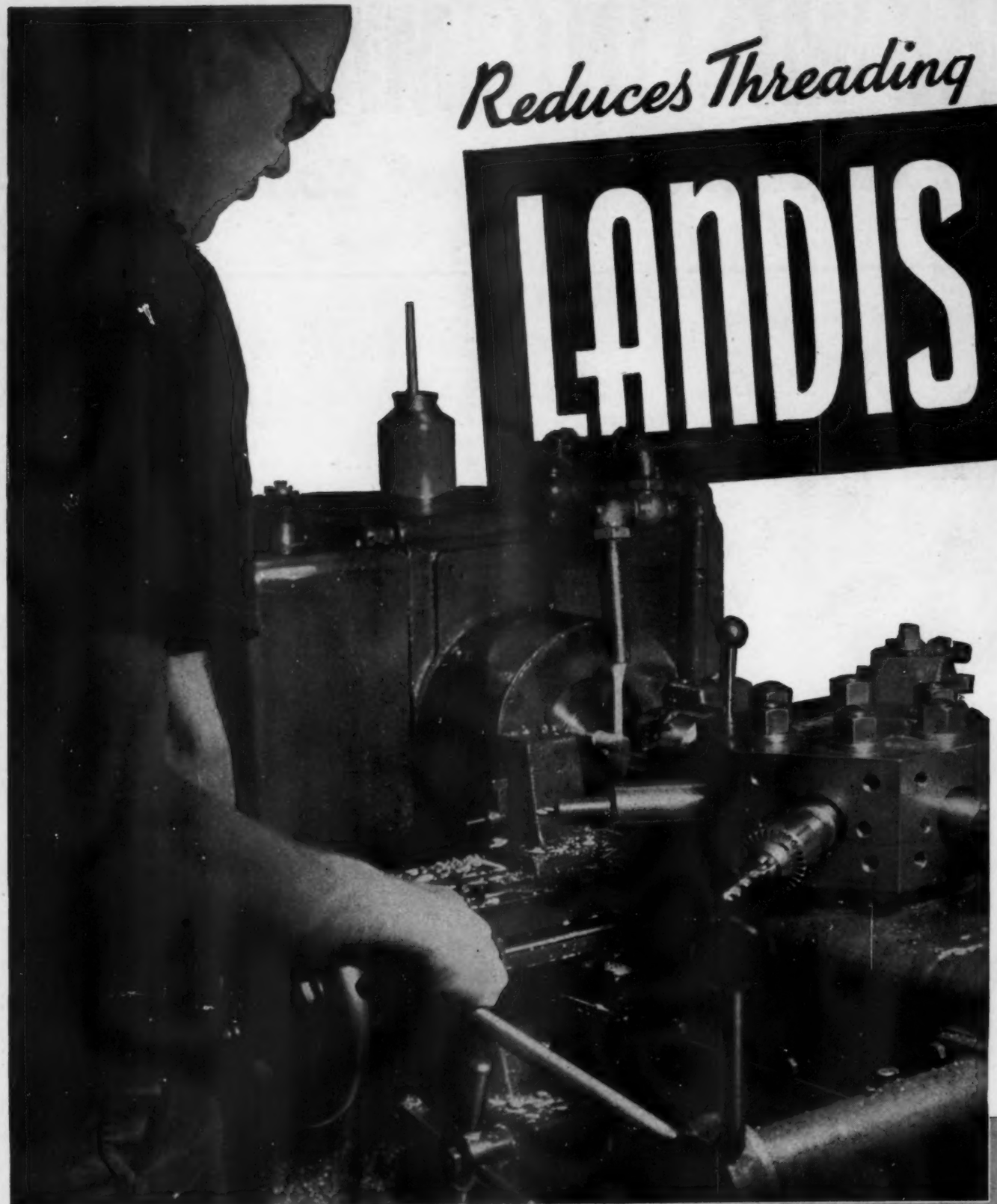
Ease of Spindle Control

The single lever speed selector, convenient spindle reverse and spindle clutch levers are located on the side of the column for ease of control. The spindle clutch lever for starting and stopping the spindle is quickly adjusted to the desired and most convenient front or rear operating position.

From every angle, Van Norman Horizontal millers give you every advantage in cutability and ease of operation. These machines will give maximum quality service and increase production on a wide variety of general purpose and production milling. They are available in a wide variety of models and can be had with plain or universal saddles. Write for complete information.

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS



Reduces Threading

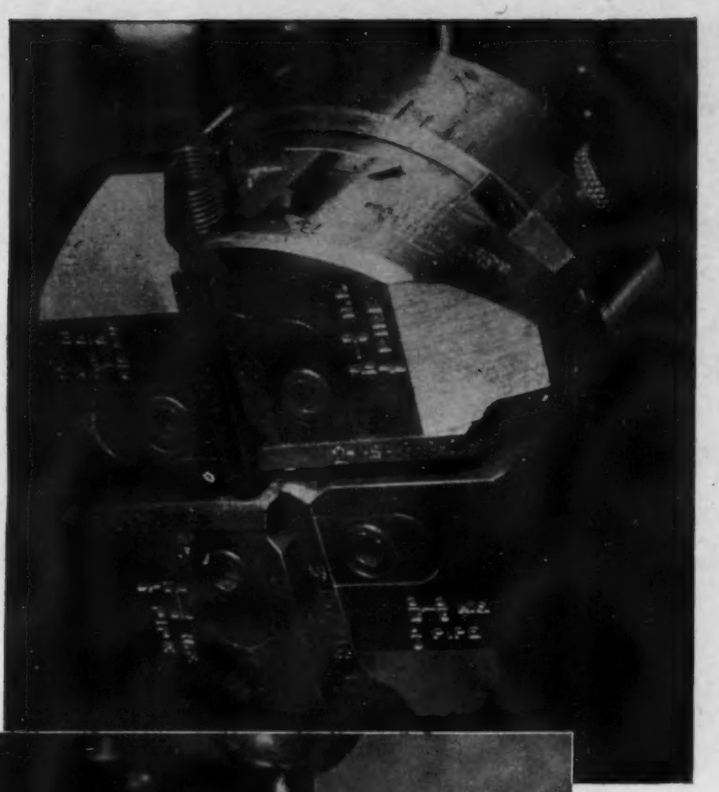
LANDIS

THREADING
AND ROLLING
MACHINES

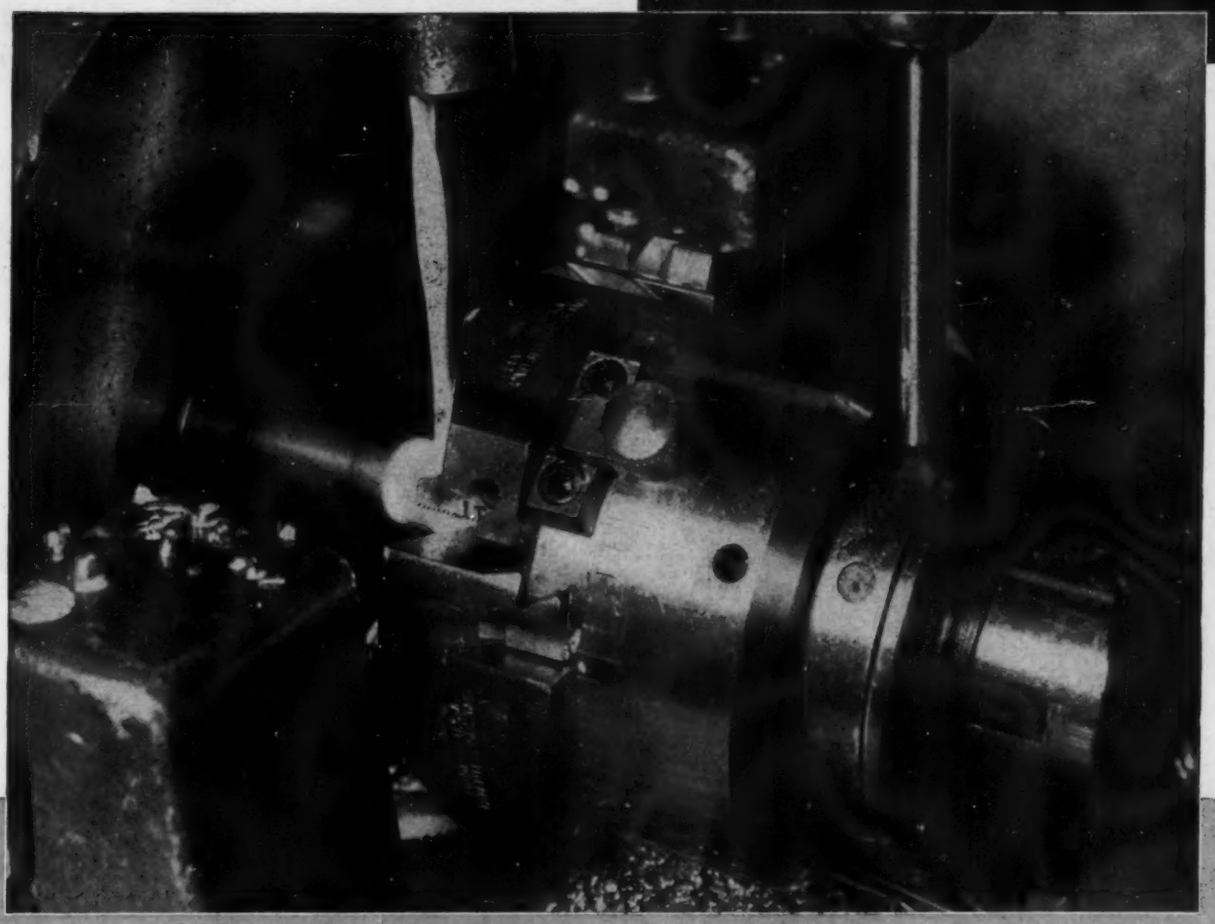
LANDIS
WAYNESBORO

Time and Cost

DIE-HEADS



Submit your threading problems to our engineers for recommendations.



MACHINE CO.
PENNA., U. S. A.

DIE HEADS
TAPS · CHASERS
GRINDERS

NEW VISUAL-AUTOMATIC SIZING

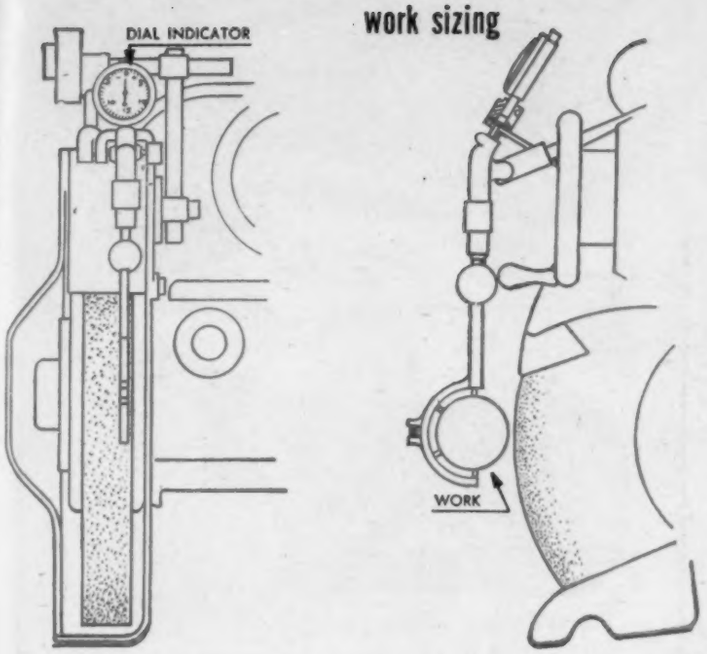
a **LANDIS TOOL** development for high production with high precision

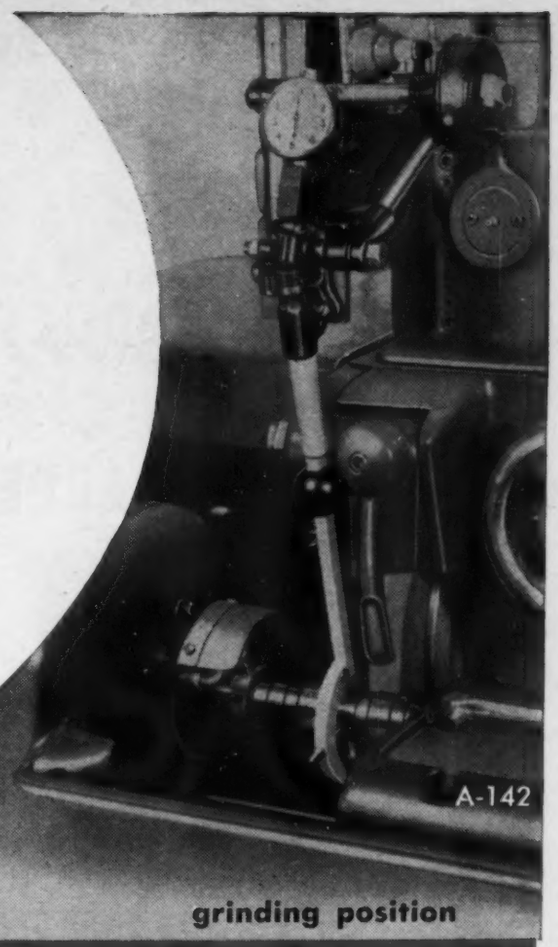
EQUIPPED WITH MICROSPHERE BEARINGS

LANDIS TOOL

Precision Grinders

work sizing



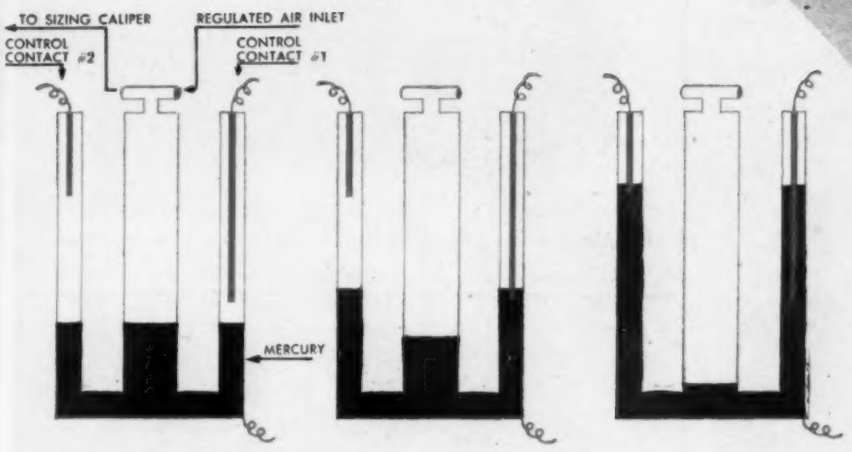


grinding position

load and unload position

HOW VISUAL AUTOMATIC SIZING WORKS

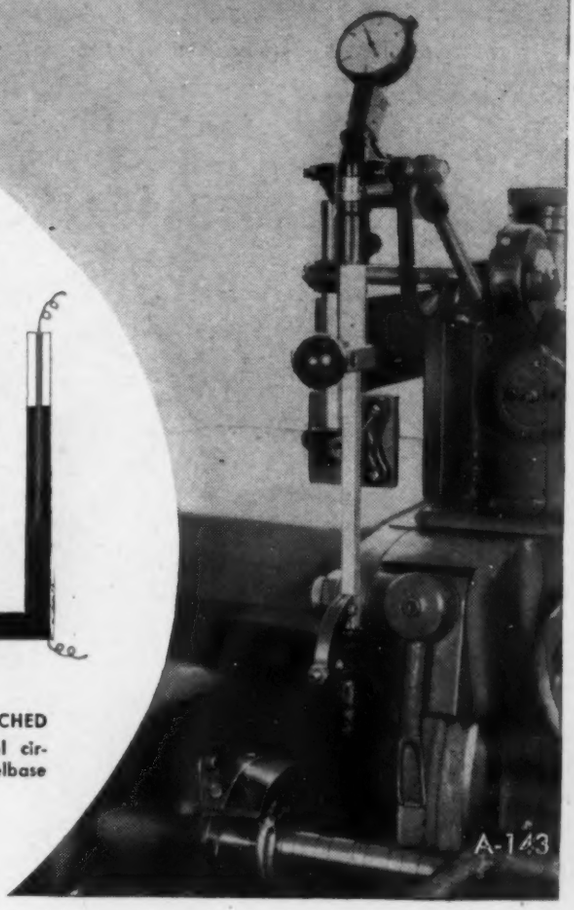
sizing control cycle



START OF GRIND
—Control circuits open.

APPROACHING SIZE
—First control circuit closes, Stops slow feed, starts fine feed.

FINAL SIZE REACHED
—Second control circuit closes. Wheelbase retracts.



LANDIS TOOL COMPANY / WAYNESBORO, PENNA.

HARDINGE
ELMIRA, N.Y.

PRECISION PRODUCTS for BROWN & SHARPE machines

The name Hardinge symbolizes accurate, durable and low cost precision accessories for Brown & Sharpe Automatics and Wire Feed Screw Machines. Specify Hardinge products to obtain maximum production efficiency.

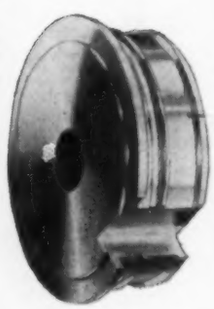
Make certain you have our bulletins for the precision products shown. If not, write for complete descriptive literature, specifications and attractive prices. Purchasing, Engineering, and Production Departments welcome Hardinge Bulletins — they simplify ordering.

STOCK DELIVERY

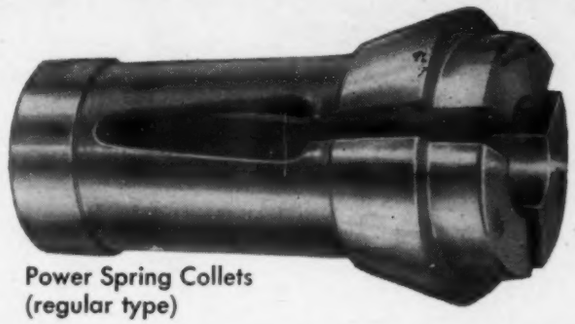
HARDINGE BROTHERS, INC.

ELMIRA, N. Y.

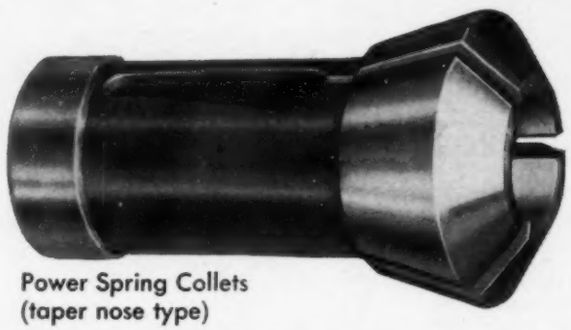
Circular Cut-off Tools



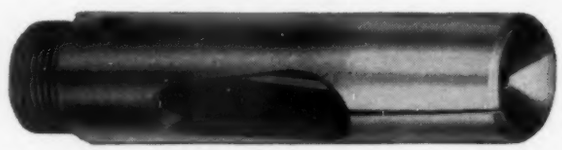
Circular Form Tools



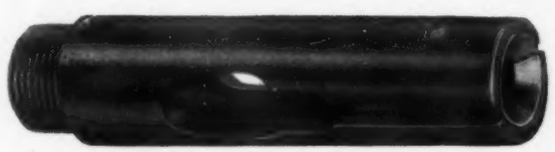
Power Spring Collets
(regular type)



Power Spring Collets
(taper nose type)



Feed Fingers (regular type)



Master Feed Fingers and Pads

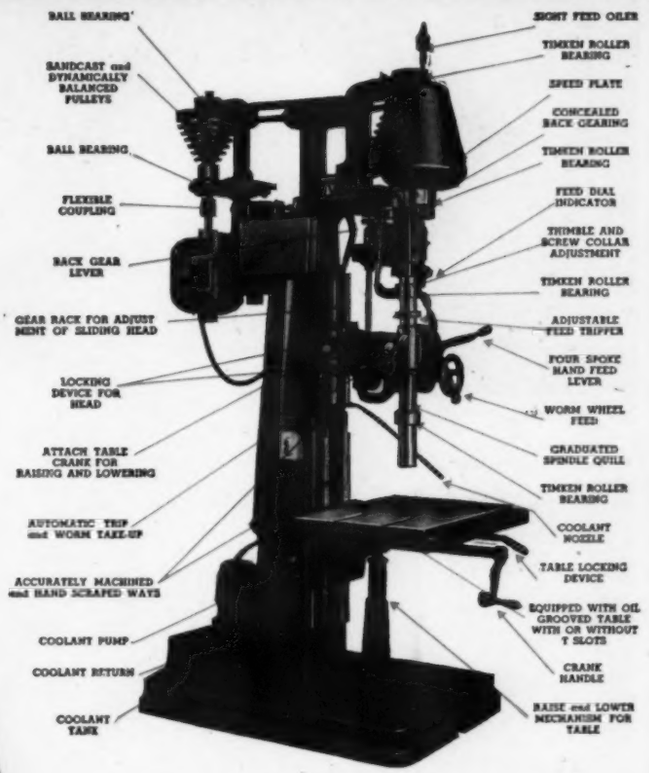
Master Feed Fingers
with Adjustable Tension

Canedy-Otto

SLIDING HEAD BOX TYPE FLOOR DRILLS

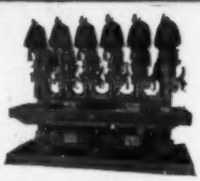
C THE WORLD OVER O

Designed to provide an accurate, fast, sturdy, dependable drill for a moderate initial investment and low maintenance cost. Unit is equipped with anti-friction ball bearings; all castings are seasoned and sturdy; all gears of high alloy steel, accurately machined; all surfaces are hand scraped to a minimum tolerance. Available with V-belt drive — 16 spindle speeds. Power feed of positive, gear driven type. Four rates of feed are obtained through dial knob indicator. Automatic stop for predetermined depth drilling. 21" size — 1½" capacity.



SINGLE SPINDLE MODEL

21" Box Column Sliding Head Floor Drill



6-Spindle 21" Box Column Sliding Head Floor Drill

4-Spindle 21" Box Column Sliding Head Floor Drill

16" No. 3000 F.V. 1-Spindle Box Column Floor Drill

16" No. 5—10,000 B.V 2-Spindle Bench Drill

14" No. 3000 F.V. 1-Spindle Sensitive Floor Drill

Standardize on CANEDY-OTTO drill presses throughout your shop. The completeness of the CANEDY-OTTO line enables you to do this — to fill all your requirements from this one source. So write today for our catalog describing in detail the many drill presses that bear the CANEDY-OTTO trade-mark — your guarantee of greater value, since 1892.

CANEDY-OTTO MFG. COMPANY

Designers & Manufacturers of the World's Most Complete Drill Press Line
CHICAGO HEIGHTS, ILLINOIS

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NORTON GRINDERS
and Lappers

The new NORTON 10" x 20" UNIVERSAL GRINDER

THIS new NORTON Universal will bring economy to your grinding jobs that require a multipurpose machine in this size range.

It is precise; it is extremely versatile; it makes rough cuts as readily as it produces the finest precision finishing. The convenience of its controls and adjustments give it a degree of handling ease that is outstanding.

Here are some highlights:

- Head and Footstock positions interchangeable
- Wheel Spindle designed for right or left-hand drive
- Internal Grinding Attachment hinged to front of wheel slide
- Wheel Head easily positioned for varied set-ups—swivels 360°
- Additional amount of wheel head adjustment in upper portion of slide
- Dovetail surface on front of wheel head for special brackets

Catalog No. 170 gives full details of the Norton 10" x 20" Universal—write for copy.

NORTON COMPANY, WORCESTER 6, MASS.

Distributors in All Principal Cities

M-555

A UNIQUE HEADSTOCK

A hollow spindle takes up to 1" diameter stock clear through

No. 10 Jarno taper each end of spindle

Swivels 360°

3" standard lathe cam lock nose on one end of spindle

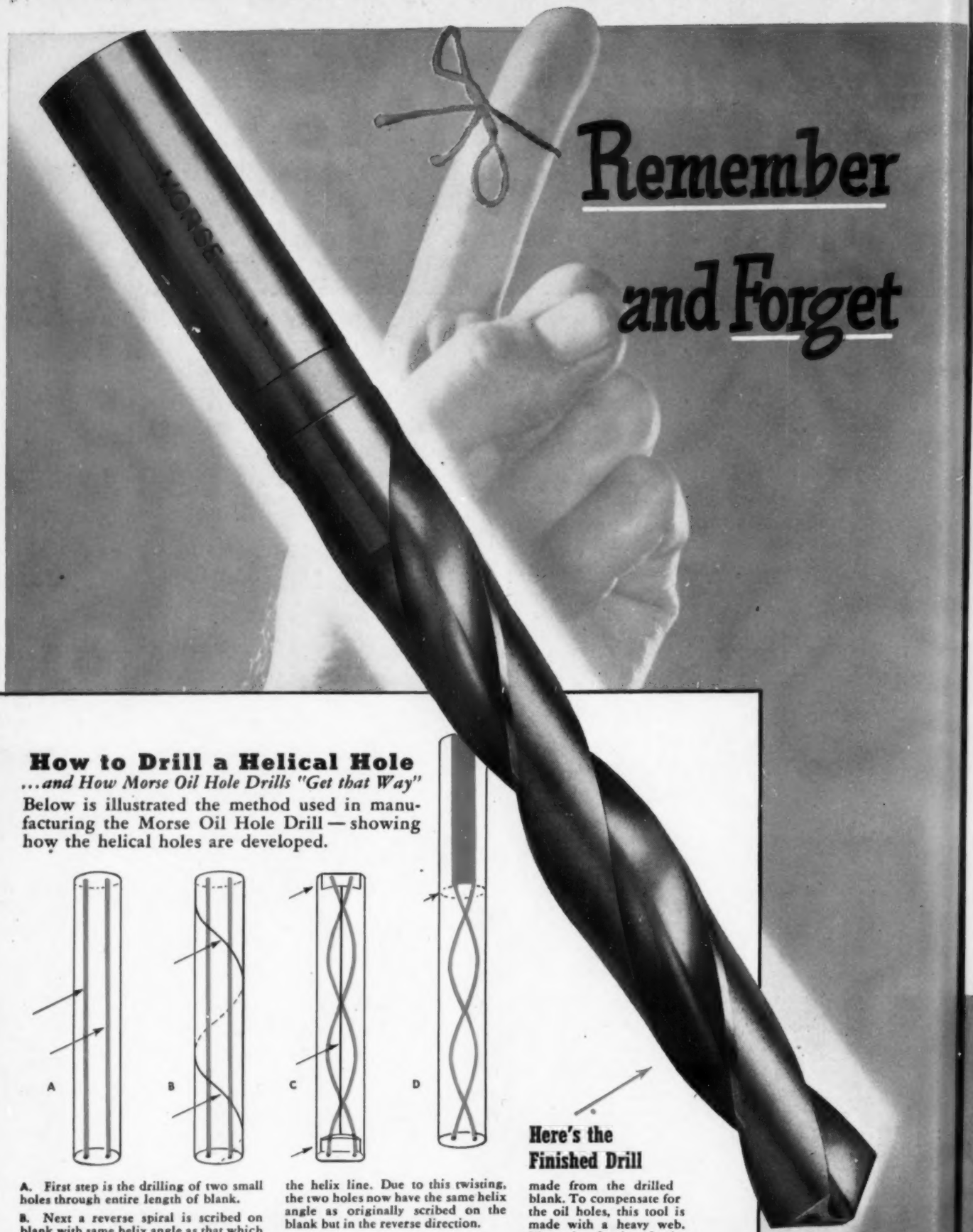
Speed changes from 50 to 500 r.p.m. by finger-tip electronic control

Jogging control provided

CYLINDRICAL—exceptionally smooth hydraulic traverse with independent right and left-hand dwell control—automatic wheel feed at each reversal.

INTERNAL—individually powered internal spindle permanently hinged to front of wheel slide for maximum convenience and rapid set-ups.

Remember and Forget



How to Drill a Helical Hole

...and How Morse Oil Hole Drills "Get that Way"

Below is illustrated the method used in manufacturing the Morse Oil Hole Drill — showing how the helical holes are developed.

A. First step is the drilling of two small holes through entire length of blank.

B. Next a reverse spiral is scribed on blank with same helix angle as that which will be embodied in the finished drill.

C. Here is shown the blank after it has been tanged, brought to a red heat and put through a twisting operation to straighten the helix line. Due to this twisting, the two holes now have the same helix angle as originally scribed on the blank but in the reverse direction.

D. Next a shank is welded onto the blank and a large hole is drilled through the shank to meet the two small holes in the body.

Here's the Finished Drill made from the drilled blank. To compensate for the oil holes, this tool is made with a heavy web. Thus is developed the rugged Morse drill which is widely used in deep hole drilling.

the MORSE Oil Hole Drill your Deep Hole Drilling Problems

This Made-for-its-Job Tool Delivers Coolant and Lubricant Under High Pressure Direct to Cutting Edges — Helps Clear Chips

Here's the tool specifically designed for deep hole drilling — overcomes the difficulty of drilling 'em deep. Pressure of 150-200 lbs. forces the lubricant and coolant deep down to the business end of the tool, where the cutting edges are at work. When drilling cast iron, air is used for blowing out the chips and keeping the drill cool. Result: drilling time is shortened, cutting edges have longer life.

This tool is available in stock in diameters from $\frac{3}{8}''$ to 2"—in "specials" it has been made up to four feet long and for drilling holes three feet in depth. No. 1479 Oil Hole Drill with Straight Shank is illustrated. Your Industrial Supply Distributor will be glad to help you obtain a special Morse recommendation, for the efficient use of oil hole drills in your plant.

Accuracy, Quality, Uniformity: the MORSE Code of Cutting-Tool Manufacture

MORSE TWIST DRILL & MACHINE COMPANY

The Original Manufacturer of Twist Drills

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Production Records Broken!

THE simplicity and convenience of control of the Gray Horizontal Boring, Drilling and Milling Machines created a sensation at the Machine Tool Show. These powerful, versatile machines are breaking production records throughout the country.

Write for fully illustrated descriptive Bulletins Nos. 48 & 54

The G.A. GRAY *Company*

planers • milling planers
planer type milling machines
horizontal boring machines

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Specify JOHNSON GENERAL PURPOSE BEARINGS

Now Ready for

IMMEDIATE DELIVERY

Now you can secure ALL your requirements in finished bronze bearings . . . *without delay*. Adequate stocks of over 850 sizes of Johnson General Purpose Bearings are now located in all of our various branches and with leading Industrial Supply Distributors throughout the nation.

Johnson General Purpose Bearings are fully machined, ready for immediate installation. Every item in the line is of the highest quality bearing bronze available. Oil holes, slots or oil grooves can be easily, quickly and economically added.

Why not check your immediate needs NOW? Permit us to show you our excellent service. The bearings will prove their quality through performance.

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Typical Examples

INGE

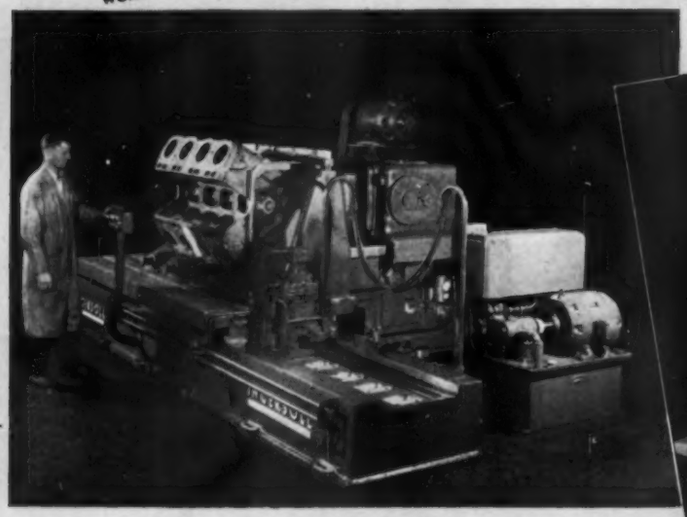
S P E C I A L

This Ingersoll 2-Spindle Vertical Cylinder Boring Machine utilizes a single point retractable boring tool and hand operated work holding device to finish bore 26 tractor cylinder sleeves an hour.

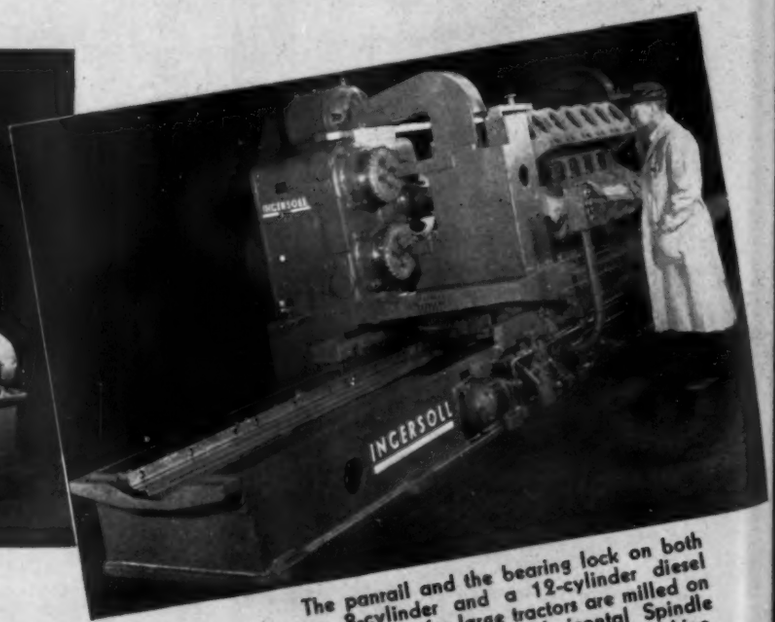
These seven machines were recently built for the tractor industry. They are specially designed to do a particular job, and therefore, will probably not be applicable to your manufacturing methods.

They show you how specially designed equipment is being profitably used by an expanding and progressive industry. Each was designed and built as a unit comprised of machine, fixture and cutters — with a guarantee on production and accuracy.

We will be pleased to discuss with you any of your problems whether or not they are similar to the operations shown here.



This Ingersoll Traveling Head Milling Machine with a special indexing table mills the ends of the crank bearing in a diesel engine case for a large crawler type tractor.



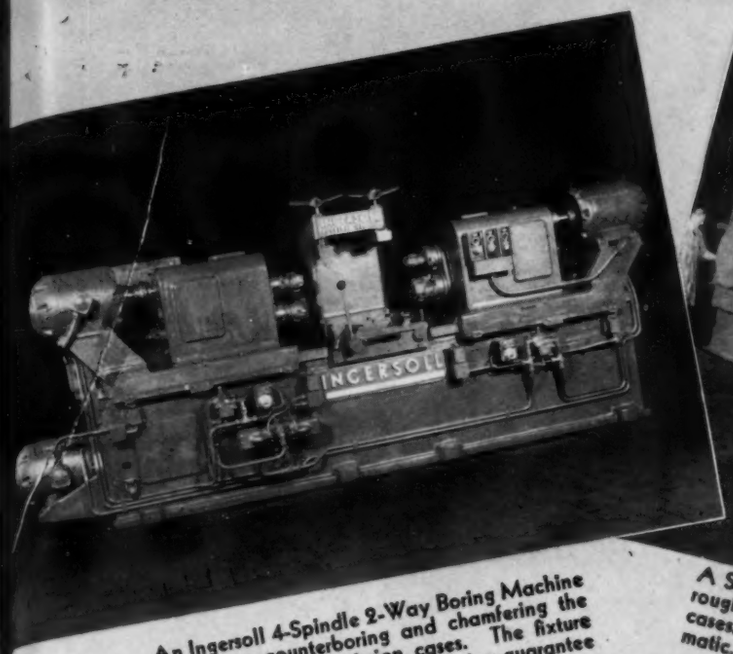
The panrail and the bearing lock on both an 8-cylinder and a 12-cylinder diesel engine case for large tractors are milled on this Special Ingersoll Horizontal Spindle Openside Milling Machine.

M A C H I N E S • F I X

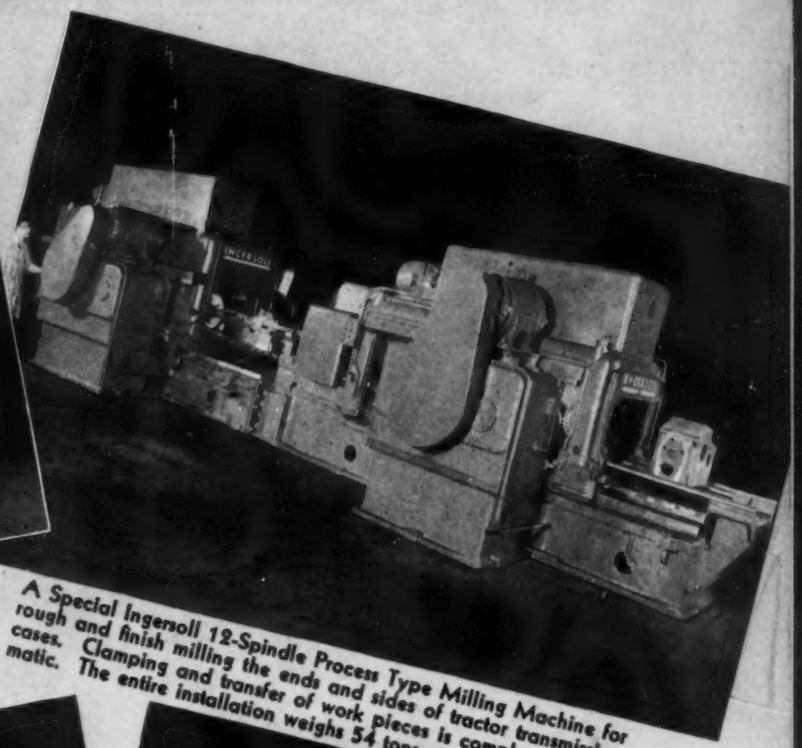
THE INGERSOLL MILLING

RSOLL *Milling Boring*

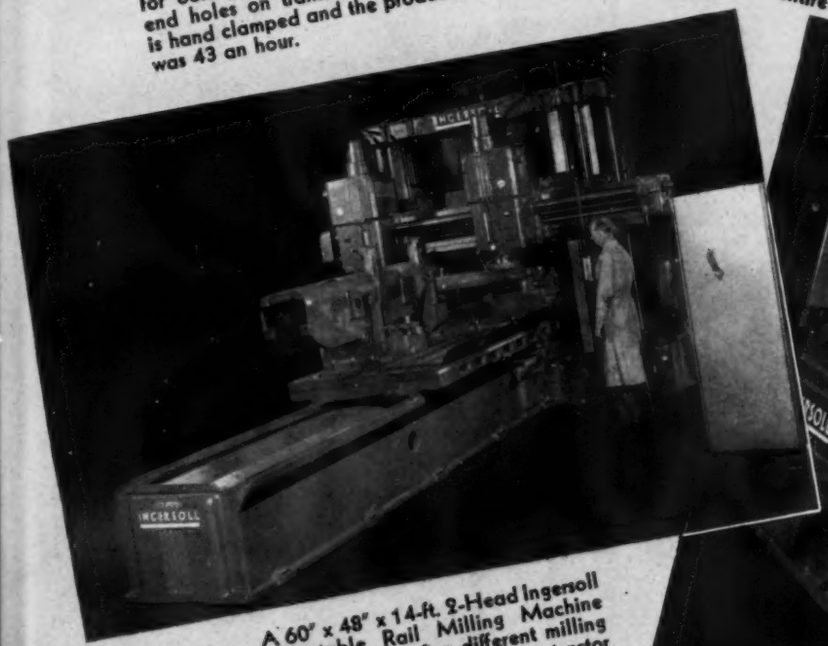
EQUIPMENT



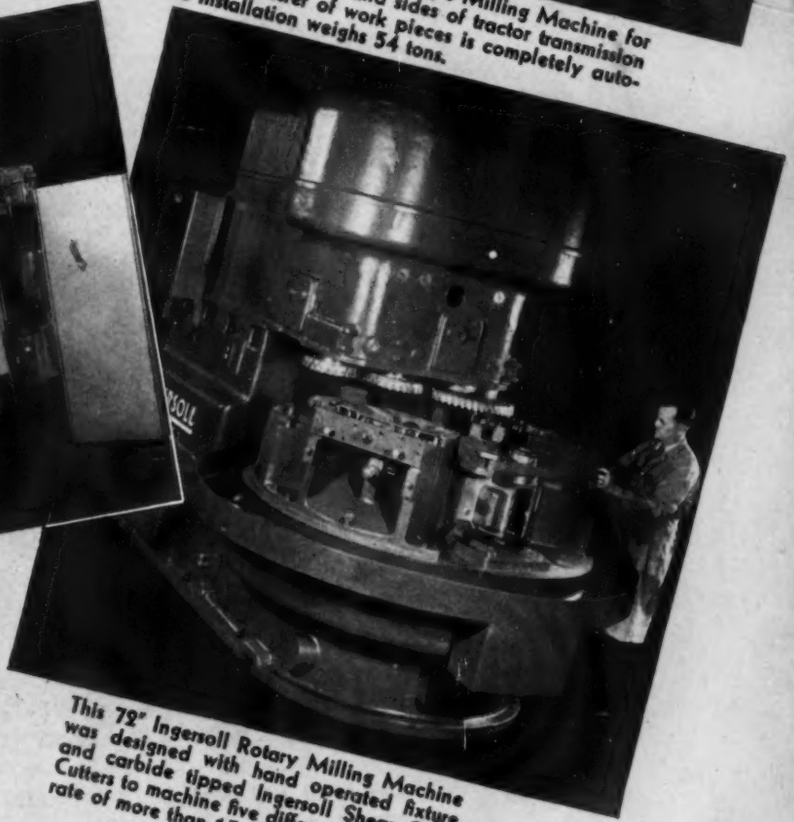
An Ingersoll 4-Spindle 2-Way Boring Machine for boring, counterboring and chamfering the end holes on transmission cases. The fixture is hand clamped and the production guarantee was 43 an hour.



A Special Ingersoll 12-Spindle Process Type Milling Machine for rough and finish milling the ends and sides of tractor transmission cases. Clamping and transfer of work pieces is completely automatic. The entire installation weighs 54 tons.



A 60" x 48" x 14-ft. 2-Head Ingersoll Adjustable Rail Milling Machine built to perform five different milling and boring operations on a tractor frame. Machine, fixture and right angle attachment weighs 73,000 lbs.



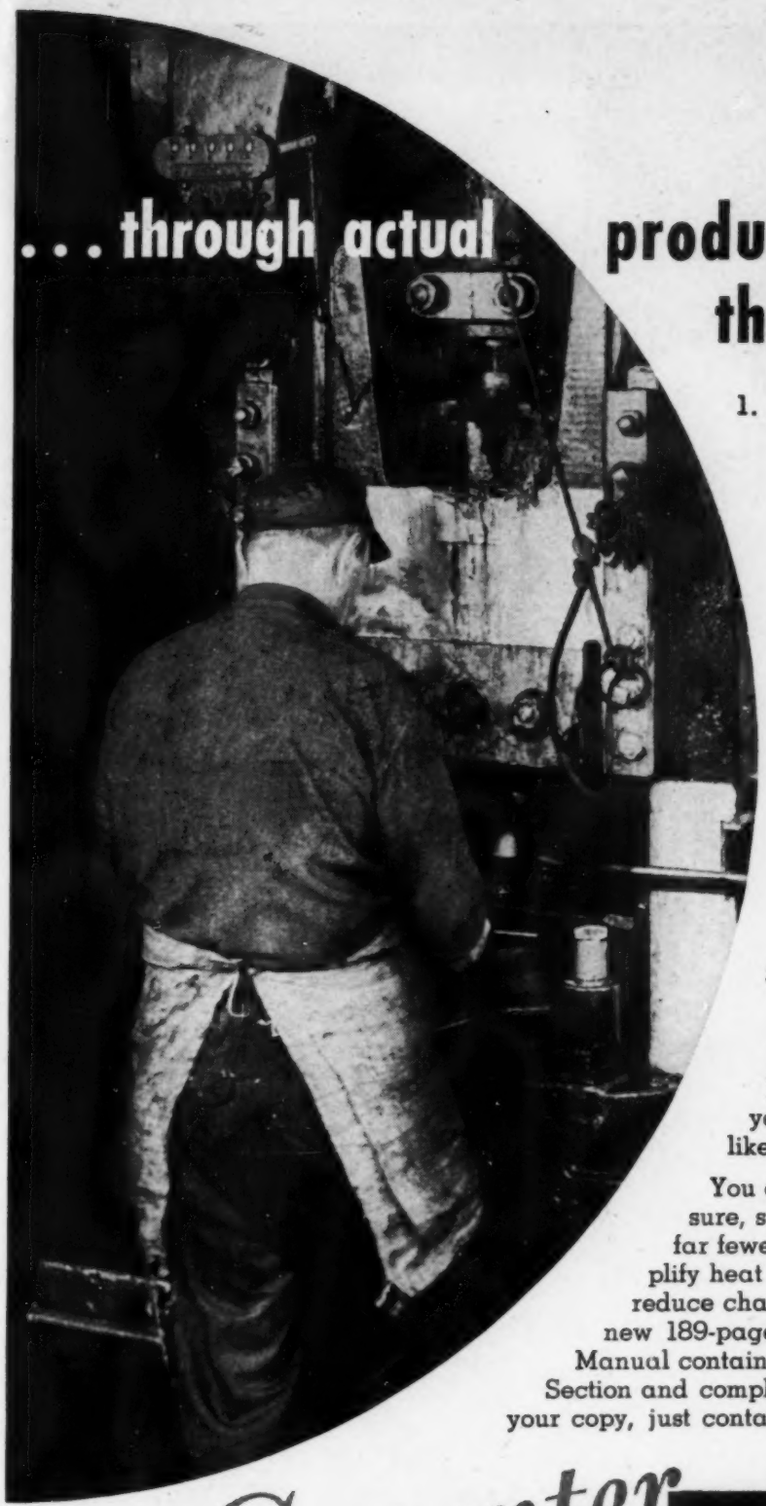
This 72" Ingersoll Rotary Milling Machine was designed with hand operated fixture and carbide tipped Ingersoll Shear Clear Cutters to machine five different parts at the rate of more than 15 an hour.

T U R E S • C U T T E R S

M A C H I N E C O . , ROCKFORD, ILLINOIS

Just Off The Press! This large, 21" x 30" 4-color Chart, placed right on your tool room wall, gives you all the information you need to start cashing-in on the Carpenter Matched Set Method. For your Tool Steel Selector Wall Chart, see your Carpenter representative.

THE CARPENTER STEEL COMPANY, 109 WEST BERN ST., READING, PA.



. . . through actual production that reduces costs!

Here's Real Help

1. *Help In Tool Steel Selection!* The improved Carpenter Matched Set Method enables you to quickly choose the right steel for best results on each tooling job. Just by following the arrows on the Matched Set Diagram, you can know exactly which steel to pick for extra wear resistance, greater toughness, assured hardening accuracy and safety, etc.

2. *Help That Simplifies Heat Treating!* The heat treatment of Carpenter Matched Tool Steels has been simplified beyond anything previously known. Instead of "guessing" about important items such as speed of heating, furnace atmosphere, time for drawing, etc.—you can be sure of getting the results you want with the help of complete and practical working data.

3. *Help To Increase Tool and Die Life!* If the tools and dies you are using fail prematurely in service, the Carpenter Matched Set Method helps you determine which steel has the right properties for your job—enables you to more quickly arrive at the one steel most likely to boost output per grind and reduce failures.

You get many more advantages when you use this sure, safe guide to better, longer-lasting tools. With far fewer steels to work with, you can simplify heat treatment, lower inventories, and reduce chances of tool steel "mix-ups". The new 189-page Carpenter Matched Tool Steel Manual contains a handy useful 80-page Selector Section and complete heat treating information. For your copy, just contact your Carpenter representative.

Carpenter **MATCHED TOOL STEELS**

AND YOU CAN GET IMMEDIATE DELIVERY FROM STOCK!...CALL YOUR CARPENTER WAREHOUSE OR DISTRIBUTOR

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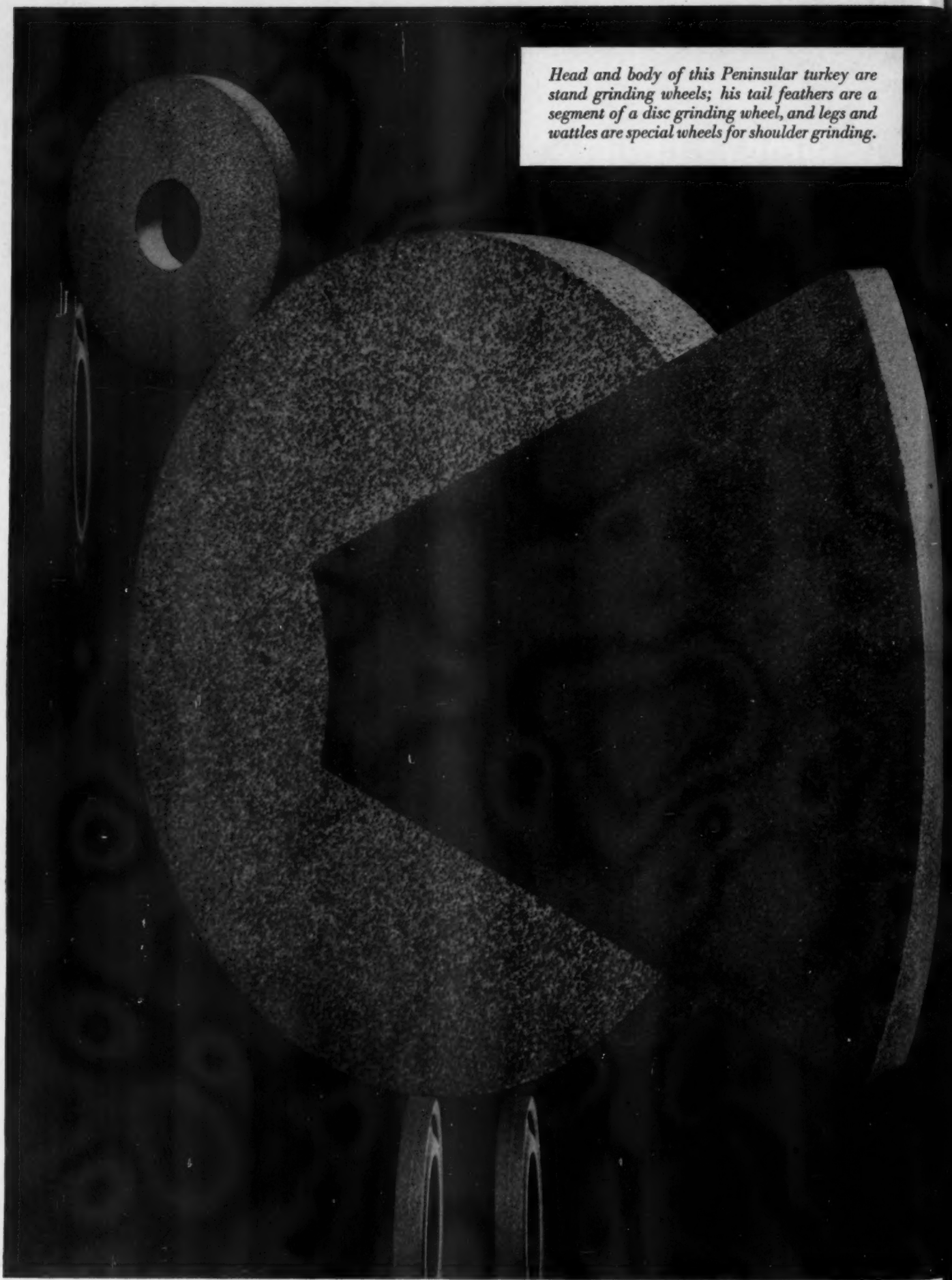


Head and body of this Peninsular turkey are stand grinding wheels; his tail feathers are a segment of a disc grinding wheel, and legs and wattles are special wheels for shoulder grinding.

Thanksgiving feast for your cost department

Would you like to invite your cost department to a feast of extra profits every day?

Maybe a careful look into your grinding operations will lead to reduced production expenses . . . savings that would make your cost men give thanks over and over again for the many dollars saved.

You'll be missing a good thing if you fail to consider this proposal: Let Peninsular Engineers give your grinding a complete study.

They will investigate your grinding from every angle—your equipment, the materials you grind and all other factors that influence grinding costs. From results learned, they will offer you a job-designed grinding program that may mean appreciable savings for you.

Since 1889, Peninsular Engineers have specialized in solving grinding problems. We believe they can render a valuable service for your grinding, too.

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Pittsburgh, Houston, St. Louis, Cincinnati.

PENINSULAR

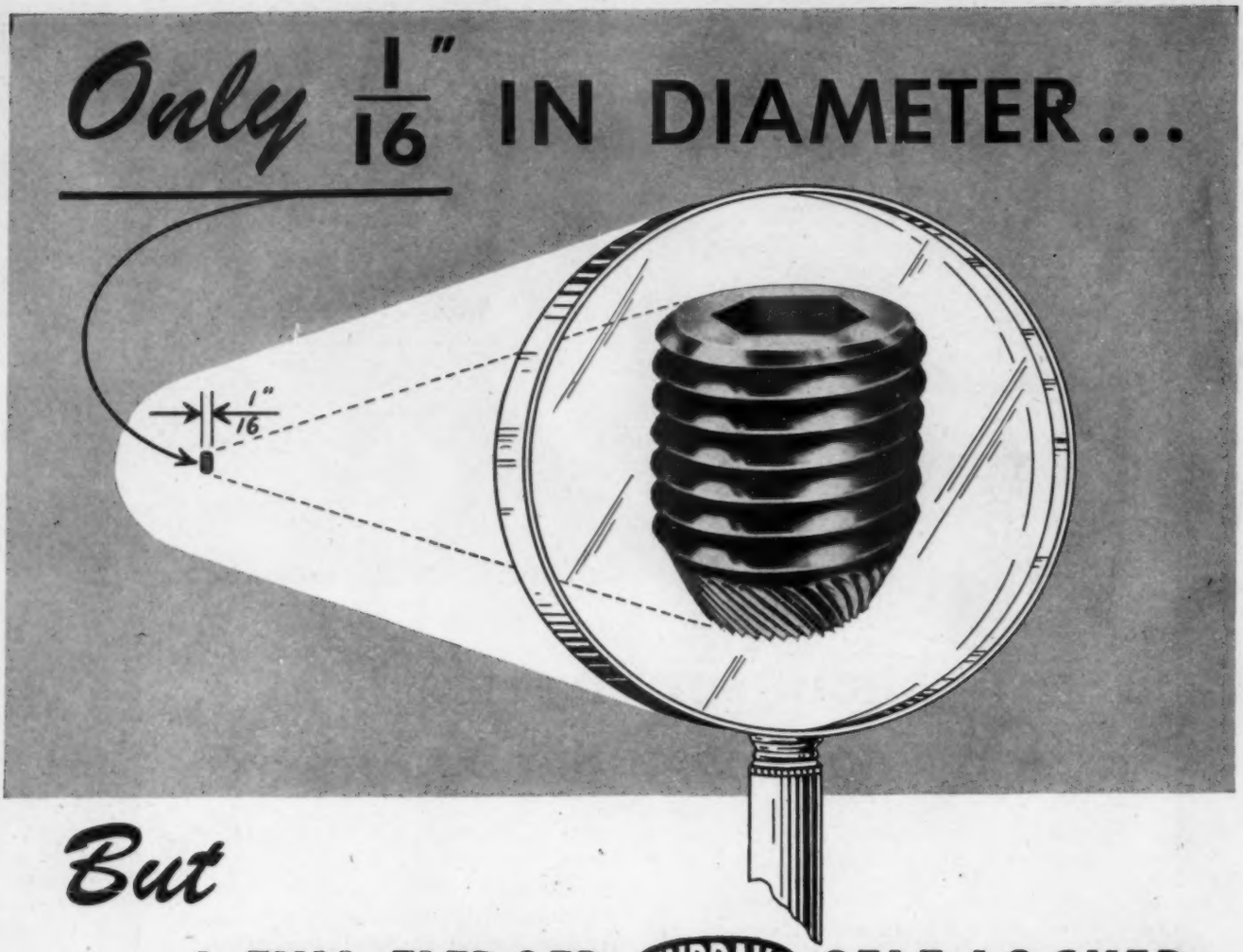
INDIVIDUALLY PENINSULAR *ENGINEERED*

GRINDING WHEELS

SINCE 1889

SPECIALISTS IN RESINOID & VITRIFIED BONDED WHEELS

Only 1/16" IN DIAMETER...



But A FULL-FLEDGED UNBRAKO SELF-LOCKER

Reg. U.S. Pat. Off.

...KNURLED CUP POINT, HOLLOW SOCKET HEAD, AND ALL

"Unbrako" and "Hallowell" Products are sold entirely through Industrial Distributors.

Knurling of Socket Screws originated with "Unbrako" in 1934.

Yes, regardless of size, the knurled cup points of "Unbrako" Socket Set Screws dig-in and "*stay dug*" — even when subjected to the most chattering vibration. Yet, they can be easily backed-out with a wrench and used over again and again. Write for your copy of the "Unbrako" Catalog of Socket Screw Products.

The Knurled threads make this screw a Self-Locker, too, for Flat, Cone, Oval, One-Half and Full Dog Points.

Pat'd & Pats. Pend.

The Knurled head of this "Unbrako" provides a slip- and fumble-proof grip, though the fingers and head be ever so oily, therefore, it can be screwed-in faster and farther before it becomes necessary to use a wrench.

You can't screw socket screws in or out without a hex-socket wrench so why not get our No. 25 or No. 50 "Hallowell" Hollow Handle Key Kit which contains most all hex bits.

Kits: Pats. Pend.

OVER 44 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA., BOX 4 • BRANCHES: BOSTON • CHICAGO • DETROIT • INDIANAPOLIS • ST. LOUIS • SAN FRANCISCO

bore ream thread

IN *ONE* OPERATION

Photographs, courtesy of Eaton Manufacturing Co., Cleveland, Ohio.

The operation pictured here is typical of the practical economy made possible by the use of Murchey engineered tools.

The work piece is a truck differential carrier. It is assembled with both caps and machined on a double end unit equipped with Murchey special machine taps with rear pilots and forward boring and reaming heads.

The tools enter simultaneously from both sides to rough bore, finish bore, ream and thread in one operation. The reaming tolerance is .001", the threads are class 3 with pitch diameter tolerance .003".

LOWER COST PER THREAD — If you want to cut your threading costs on standard or special jobs, consult a Murchey Engineer.

MURCHEY MACHINE & TOOL CO.
Detroit 26, Mich.

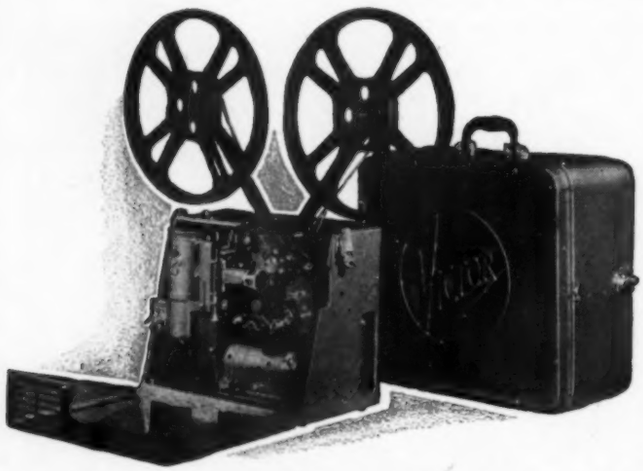
MURCHEY

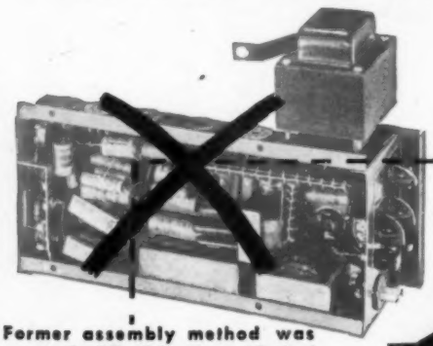
SUBSIDIARY OF THE SHEFFIELD CORP.
DAYTON 1, OHIO, U.S.A.

2849

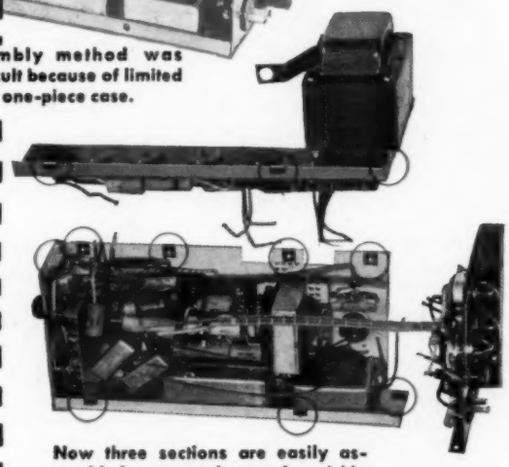
"WE DO FIND THAT WE HAVE REDUCED OUR ASSEMBLY COST APPROXIMATELY 36% ON THIS UNIT SINCE BEGINNING TO USE THE TINNERMAN SPEED NUT"

This is a direct quotation from a letter from A. S. Webeck, Works Manager of the Victor Animatograph Corporation, Davenport, Iowa, makers of 16 MM sound motion picture equipment.





Former assembly method was extremely difficult because of limited confines of this one-piece case.



Now three sections are easily assembled separately, and quickly fastened together with SPEED NUTS into completed unit.

SPEED NUTS always effect substantial savings in assembly cost, but here is a case of unusually high savings.

Victor Animatograph Corporation accepted our suggestions on the assembly of their amplifier unit. They discarded their time-consuming practice of assembling a myriad of small parts in a crowded case. Now the amplifier is assembled in three easy-to-get-at sections that are quickly fastened together with SPEED NUTS to complete the unit.

Assembler training time is cut from two months to a few hours. Assembly time is slashed, employee morale improved, and with three assembly lines instead of one, the risk of complete production stoppage due to shortage of one or two parts is avoided.

Let us demonstrate what SPEED NUTS can accomplish in improving the assembly of your product.

TINNERMAN PRODUCTS, INC.
2211 FULTON ROAD • CLEVELAND 13, OHIO

In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario
In England: Simmonds Aerocessories, Ltd., London
In France: Aerocessoires Simmonds, S. A., Paris
In Australia: Simmonds Aerocessories, Pty. Ltd., Melbourne

Speed Nuts* PATENTED

MORE THAN 4000 SHAPES AND SIZES

* Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS

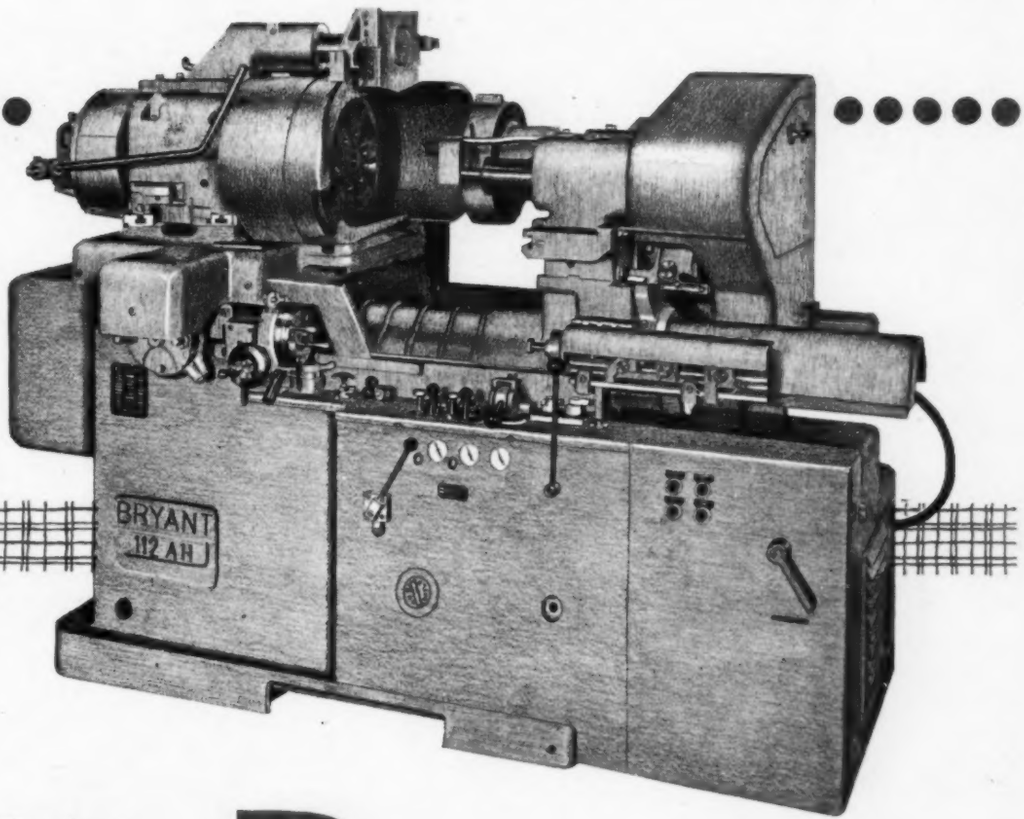
Vermont grows Chameleons, too

The Bryant 112AH Hole and Face Grinder is a real chameleon when it comes to changeover. First, the 112AH is equipped with an American Standard Spindle Nose, so that holding fixtures, chucks or face plates can be changed in less than 2 minutes. Second, selection of cycle phases for either manual or automatic operation is accomplished simply and rapidly through main wheelslide control. Wheelslide traverse for wheel dressing and grinding may be set independently through two convenient hand throttles. Positive-locking reversing dogs set grinding stroke quickly. Third, a rapid traverse cross-feed speeds set-up and a precision feed dial provides accurate size control. Two wheelheads allow grinding the face and bore at one chucking.

In addition to the chameleon qualities the 112AH has features that make it a prolific producer. Wheelheads may be powered by belt for finishing large diameter holes or by the Bryant Hi-Frequency Wheelhead with speeds up to 100,000 r.p.m. for most efficient grinding of small bores. The No. 112AH has infinitely variable spindle speeds from 100 r.p.m. to 2000 r.p.m. Universal stop rod positions speed face grinding. And, of course, the 112AH has all the basic Bryant design and construction highlights, thus making it a producer of finer work finishes within the closest tolerances at speeds you never believed attainable. For complete information on this Vermont chameleon, ask for the Series 112AH Catalog Sheet.

112-AH

HOLE & FACE GRINDER



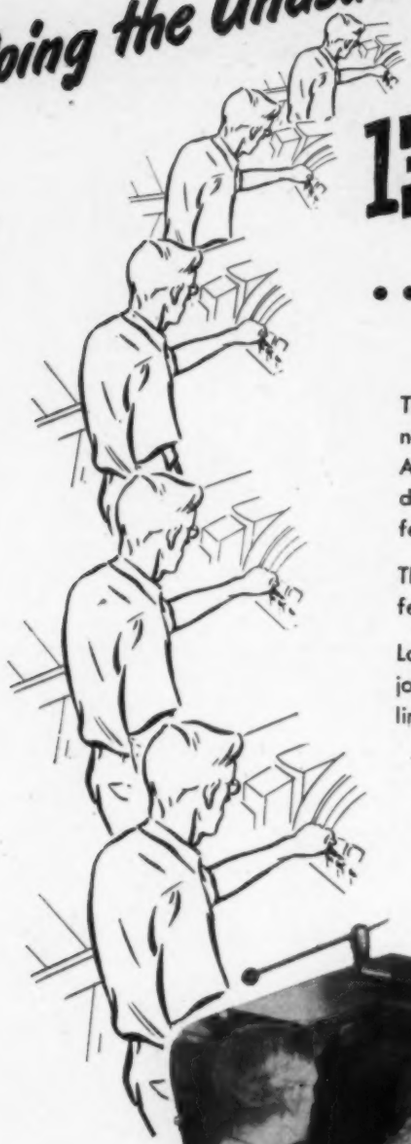
Send for the Man from

BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.

BRYANT

Doing the Unusual



13 Clutch Housings per hour

. . . WITH Lodge & Shipley ACME TURRET LATHES

says B. F. AVERY & SONS CO.

Thirteen complicated gray iron castings per hour is the record set by the noted producer of "Tru-Draft" Farm Equipment. Using the Lodge & Shipley Acme No. 1S Turret Lathe cross slide and turret tools, clutch housings . . . 13" diameter . . . for farm tractors are faced, rough and finish bored and chamfered to .002" tolerance.

This Lathe has an abundance of power and rigidity . . . ample speeds and feeds to meet high production requirements.

Lodge & Shipley Engineers can show you the faster way to do a profit-making job with L & S Acme Lathes. Write for descriptive literature showing complete line of Way, Saddle and Ram type Turret Lathes.

THE **Lodge & Shipley** COMPANY

CINCINNATI 25, OHIO

MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD

It is reported that . . . . . .

An optical comparator, developed by Westinghouse, compares the grain sizes of metal samples on a glass screen.

get ready with CONE for tomorrow

Westinghouse Lamp Div. is drawing tungsten wire as fine as .0018" a pound of which is 950 miles long.

be ready with CONE for today

The Hypermatic, a high-speed punch press made by Lempco Products, Inc. of Bedford, Ohio, is claimed to be vibrationless, even at top speed.

get ready with CONE for tomorrow

Union Pacific RR is experimenting with the adaptation of a 10,000 h.p. aircraft gas turbine to locomotive use.

be ready with CONE for today

Minneapolis-Honeywell Regulator Co. has an electronic compass for aircraft that has no moving parts and can be used as a magnetometer in prospecting.

get ready with CONE for tomorrow

In the attempt to push air speeds into the transonic range, Curtiss-Wright Corp. has developed a propeller with crescent-shaped, "swept-back" blades.

be ready with CONE for today

Brighter, cleaner and more durable shades of brown for enamels, paints, inks, plastics, etc. are forecast in duPont's announcement of its new pigment "Auric Brown."

get ready with CONE for tomorrow

The Type WAA Race Tester offered by Physicists Research Co. provides for both micro-inch measurement of surface waviness of inner and outer bearing races and control of production set-ups

Pharis Tire & Rubber Co. claims that its two-ply, glass fabric tire is stronger than four-ply rayon.

be ready with CONE for today

The new Crosley is said to be the first postwar car with an aluminum body.

get ready with CONE for tomorrow

American Welding and Mfg. Co., Warren, Ohio, is ready to road-test its application of torsional springing to railroad car trucks.

be ready with CONE for today

Lundberg-Ryan Air Explorations have ordered two Bell helicopters specially equipped for oil and ore exploration.

The National Electrical Manufacturers' Association is engaged in the standardization of small electric motors, such as those used in household equipment.

get ready with CONE for tomorrow

General Electric Co. has designed pallets of corrugated board which save shipping weight and can be thrown away after one use.

be ready with CONE for today

The top of an 85-foot, million-gallon tank at the U. S. Air Force Olmstead Airbase is being formed by spraying concrete over wire mesh.

get ready with CONE for tomorrow

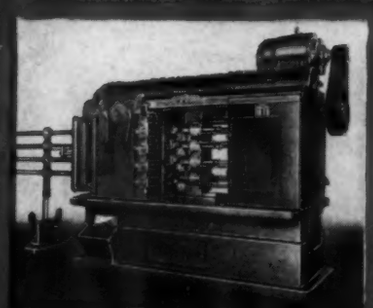
Volumetric measurement of corrosive liquids to an accurate approaching laboratory precision is made possible by a new meter made by Browser Inc. of Fort Wayne.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

NOW

In the Multi-Single 4-Spindle Conomatic, you have one machine that will produce in volume, accurately and with quality finish, the production of 4 single spindle machines—*in the floor space of one.*

The 4 connecting links illustrated are produced from .437" S.A.E. 1113 in a cycle of 6 seconds, which effects a time of 1½ seconds each.



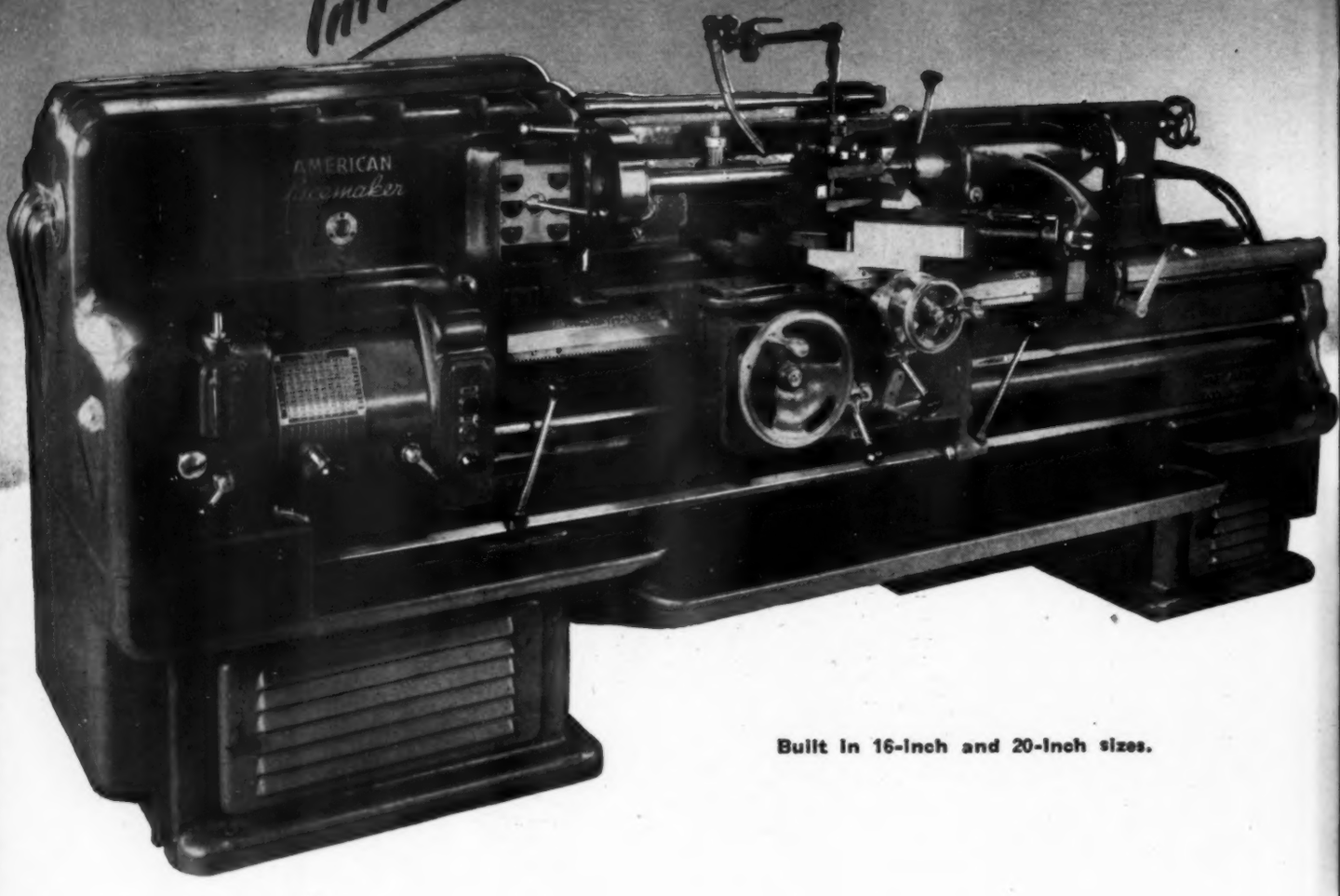
Ask your CONE *representative to show you our new color motion picture*

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

"AMERICAN" HYDRAULIC SHAFT-DUPLICATOR

Introduces a new Turning Technique that —



Built in 16-inch and 20-inch sizes.

THE AMERICAN TOOL WORKS CO.

1. Reproduces accurately from a template.
2. Reduces production costs.
3. Cuts set-up time to a fraction required by other methods.
4. Minimizes measuring and "miking".
5. Eliminates multiple tool set-ups.
6. Permits continuous cutting.
7. Is controlled by one hydraulic system.
8. Produces a "quality" finish frequently eliminating the necessity of grinding.

The new "American" "H S-D" (Hydraulic Shaft-Duplicating) Lathe is a thoroughly engineered development for reproducing work shapes from a template by means of a hydraulically controlled cutting tool. The template holder and tracer head are built in at the rear of the lathe where they will not obstruct the operator's vision of the work or interfere with loading and unloading. All operating controls are located at the front of the lathe.

It is faithful and accurate in its reproduction.

It will reproduce steps, tapers, right angle and tapered shoulders, recesses, grinding necks and radii and is especially adapted to the production of such work as spindles, motor shafts, valve stems, back shafts, piston rods, axles—in fact any shaft having an irregular contour.

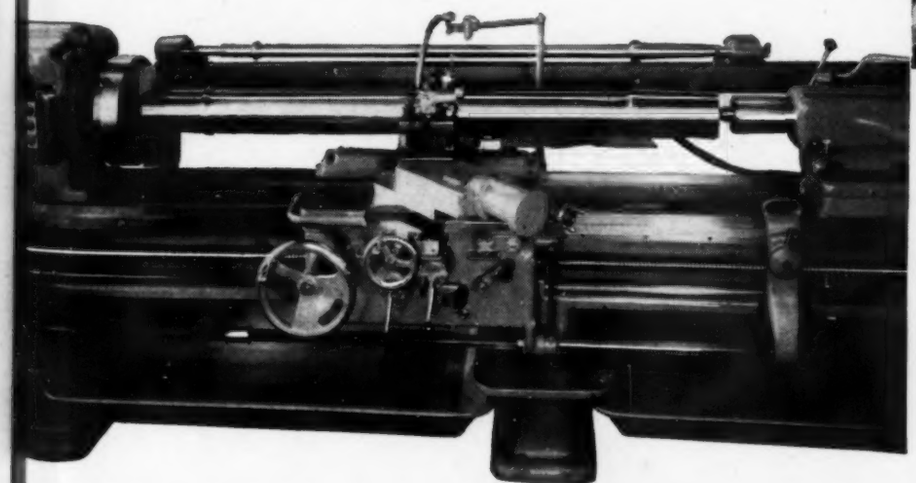
A single hydraulic system is employed for operating the hydraulic tracer valve and the piston which controls the movement of the tool slide carrying the cutting tool. This simplicity is an outstanding feature and insures accurate reproduction, freedom from failures and elimination of work rejects.

This new metal cutting technique permits continuous cutting without interruption for measuring or calipering at feeds and speeds to the cutting limit of Cemented Carbide tools. "Miking" is confined to the first diameter only after which all other diameters are secured automatically.

This machine may be quickly converted to standard lathe operations.

Descriptive Bulletin No. 35 sent upon request.

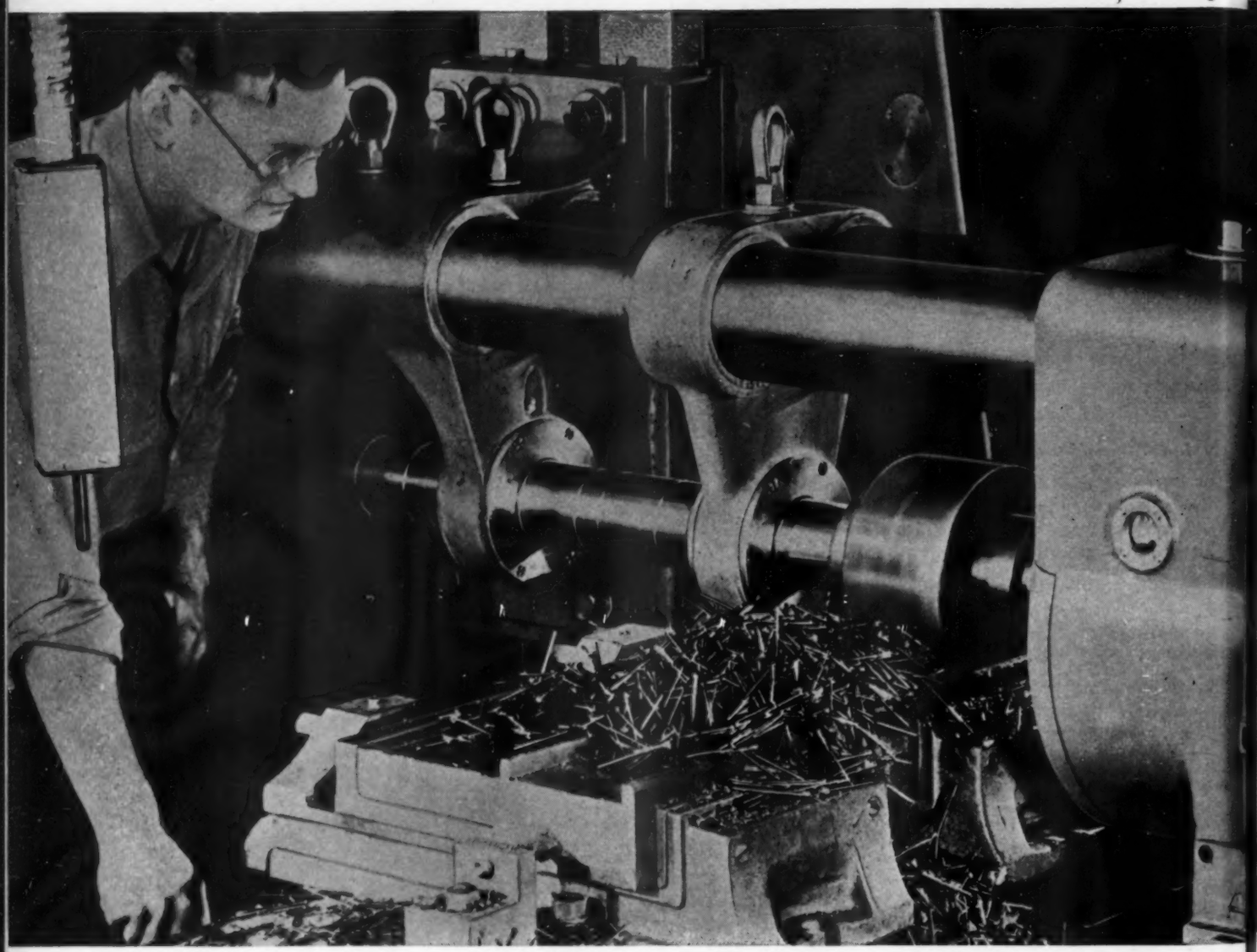
4¼" step shaft of SAE 4145 steel being machined complete in 18 minutes on 16-inch "American" "H S-D" Lathe.



Machining Locomotive Piston Rods, floor to floor, in 34 minutes on 20-inch "American" "H S-D" Lathe.

Lathes and Radial Drills **Cincinnati, Ohio, U. S. A.**

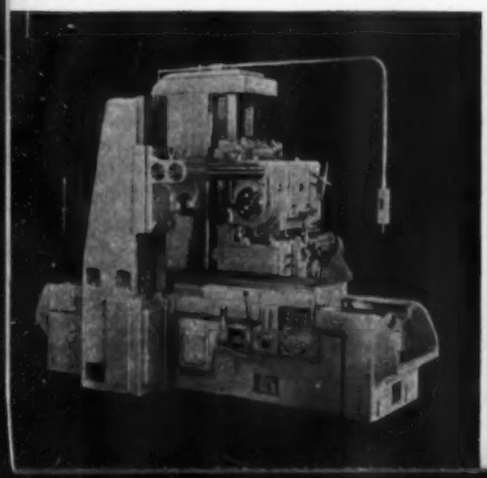
PUTS BIG BITE ON

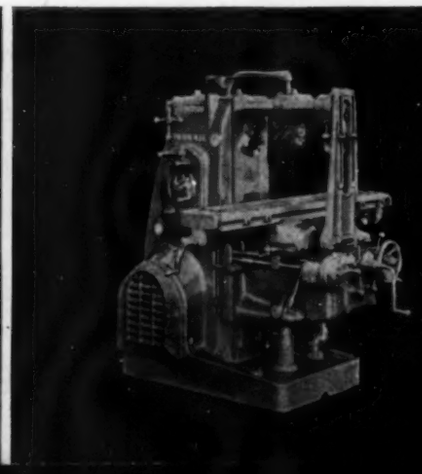


NEW SIMPLEX BED-TYPE MILLING MACHINE — Kearney & Trecker's new concept of bed-type design. Gives you wide working ranges and horse-power capacities for most effective use of all cutting tools.

MODEL 3K VERTICAL AUTOMATIC CYCLE MILLING MACHINE — New Automatic Cycle feature gives you high production capacity on long run lots — and amazing new ease of control for short runs.

MODEL 2H PLAIN MILLING MACHINE — The most popular size machine ever built. Available in Plain, Universal and Vertical types. Automatic Cycle feature obtainable on either Plain or Vertical types.





METAL & COSTS!

High power, cost-cutting Kearney & Trecker-Milwaukee Milling Machines help Industry produce more for less.

SEE that job at the left? See that pile of chips? That's a big new design of Simplex Bed Type Milling Machine knifing a carbide cutter through hard steel at a record rate.

But that's only a small hint of what Kearney & Trecker machines can do for you. There's a Kearney & Trecker machine for every milling job — in small shops, high production plants or precision tool rooms. There's a Kearney & Trecker in every standard size and type with horsepowers from 3 to 50 with working ranges to suit. Think of it! Over 250 different models, sizes and types to choose from — to select the right machine for your job!

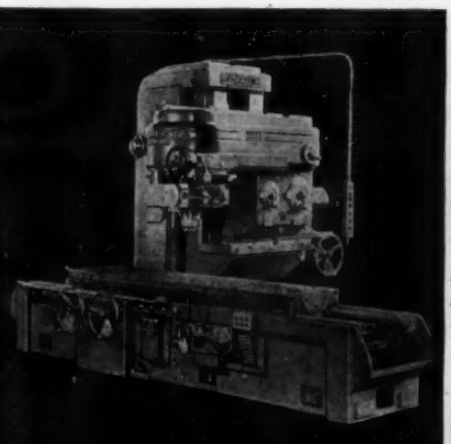
And don't overlook Kearney & Trecker's Model 2D and new 5D Rotary Head Milling Machines — miracle machines that produce any geometric shape in both horizontal and vertical planes direct from the blueprint — no models or templets needed! For precision boring — there's the Models B and C Autometrics. Machines that give you accuracy to the closest standards ever set at Kearney & Trecker.

Investigate Kearney & Trecker-Milwaukee Machine Tools! Ask how they can help you make a better product at lower costs to you.

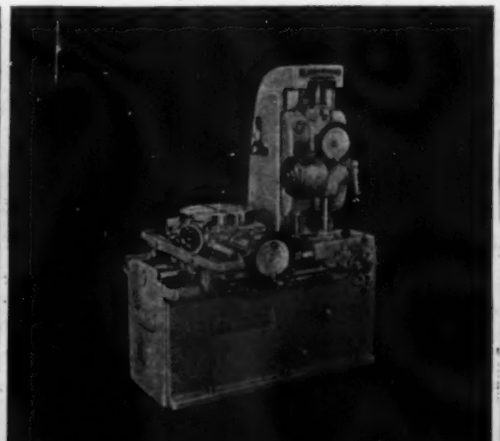
KEARNEY & TRECKER
CORPORATION
Milwaukee 14, Wisconsin

KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS

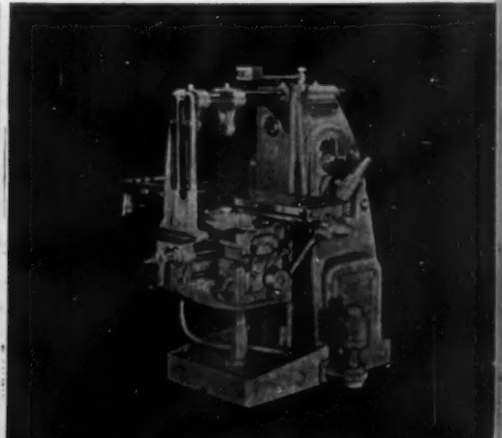
MODEL 5D ROTARY HEAD MILLING MACHINE — A miracle of big machine design. Produces any geometric shape in horizontal or vertical planes direct from blueprint — no models or templets!



MODEL B AUTOMETRIC BORING MACHINE — A precision product for extra-precise results. Rotary table permits work on several sides of workpiece in one set-up — big help in accuracy and economy.



MODEL E PLAIN MILLING MACHINE — New simplified design gives you every fundamental requirement for foreign or domestic use — plus highest dollar for dollar value obtainable anywhere.



because they can be depended on for ECONOMY, EFFICIENCY *and* SPEED

All the essential performance qualities demanded in small tools today are met in UNION TOOLS.

Faster cutting, longer life between grinds, accuracy and all-round better performance of these tools are matters of common recognition in plants busy on work where small tools are subjected to the most exacting service conditions.

You, too, can depend on UNION TOOLS for your requirements. Try them once and you'll use them regularly.

THE UNION LINE

Twist Drills — Milling Cutters — Reamers — Hobs — Slitting Saws — End Mills — Taps — Dies — Screw Plates — Profile Cutters.

UNION TWIST DRILL COMPANY, ATHOL, MASS.

STORES—New York: 61 Reade St., Chicago: 11 So. Clinton St., Detroit: 5527 Woodward Ave., San Francisco: 121 Second St., Los Angeles: 524 E. Fourth St., Seattle: 568 First Ave., South.

MANUFACTURING DIVISIONS

S. W. Card Mfg. Co. Div., Mansfield, Mass.
Butterfield Div., Derby Line, Vt.
Butterfield Div., Rock Island, Quebec.

UNION

HOW FAST COULD YOU UNSCREW THIS?

Loosening this one screw enables you to remove all chasers and blocks on the Namco Vers-O-Tool.

That's part of the reason why, with the Vers-O-Tool, you can change from dull to resharpened chasers and get back into production in *less than 60 seconds*—and be sure the first thread you cut will be precision production!

For more accurate, high-speed thread chasing, here are additional Vers-O-Tool advantages:

Vers-O-Tool Ground-Thread Circular Chasers take no longer to sharpen than old-style conventional chasers.

Every grind is an accurate duplicate of the previous grind, set to a micrometer gauge.

Vers-O-Tool Circular Chasers give more grinds —they're regrindable through a full 270°.

With the Vers-O-Tool, there's no spindle sag because of heavy, cumbersome die heads; dies are lightweight, hardened and ground throughout.

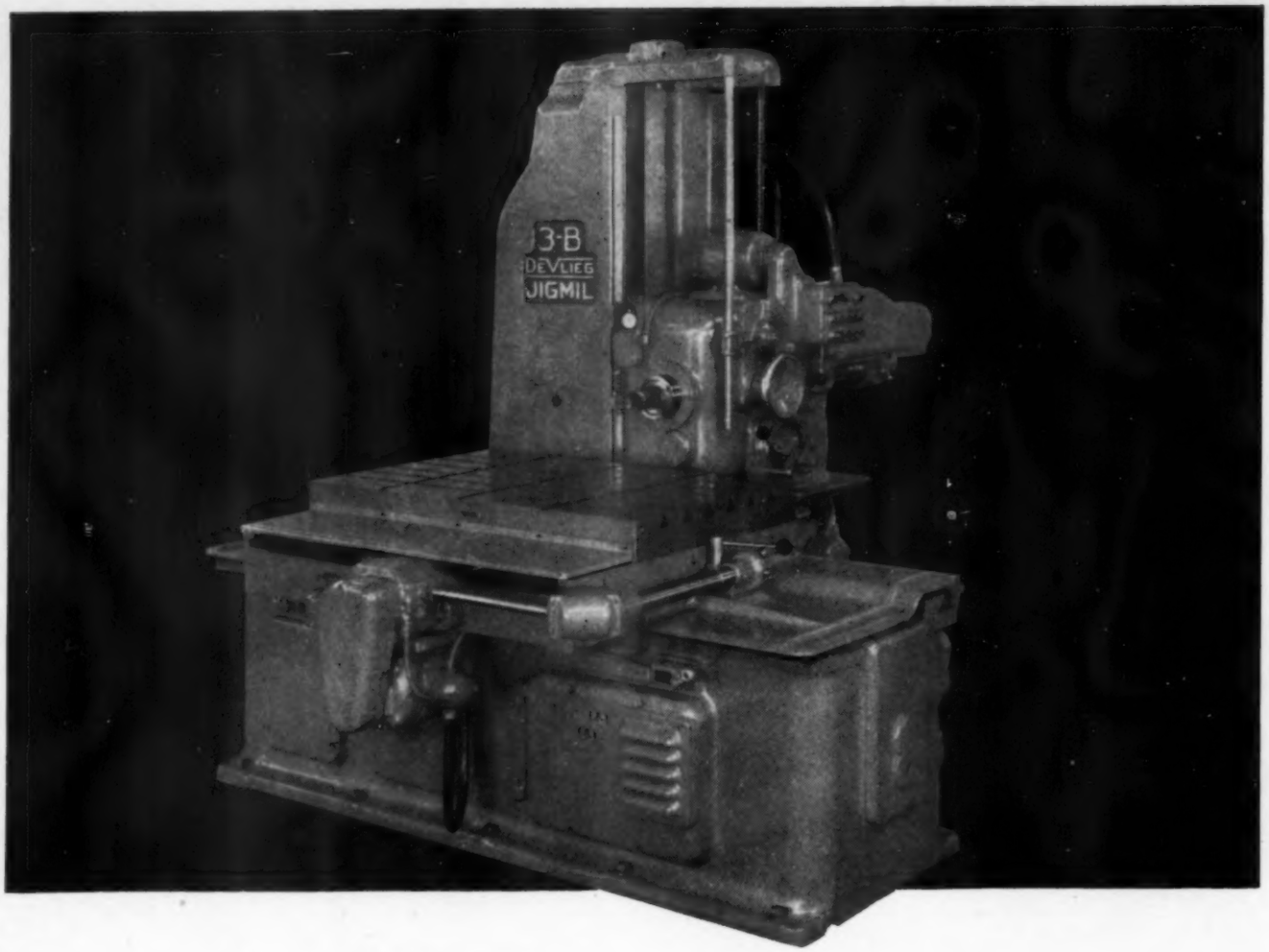
The Vers-O-Tool design is simplicity itself. Fewer parts to wear, fewer adjustments to make, faster regrinds mean longer life, greater accuracy, increased production — and lower threading costs.

FOR COMPLETE INFORMATION on Vers-O-Tools — for accurate, high-speed, low-cost thread chasing — ask for Bulletin D-42-D.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog-Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing



Those who examined the DeVlieg JIGMIL at the Chicago Show saw a complete new approach to the problems of precision boring. A method broadly applicable to economical repetitive *production work without jigs,* as well as a machine for most advantageously making jigs.

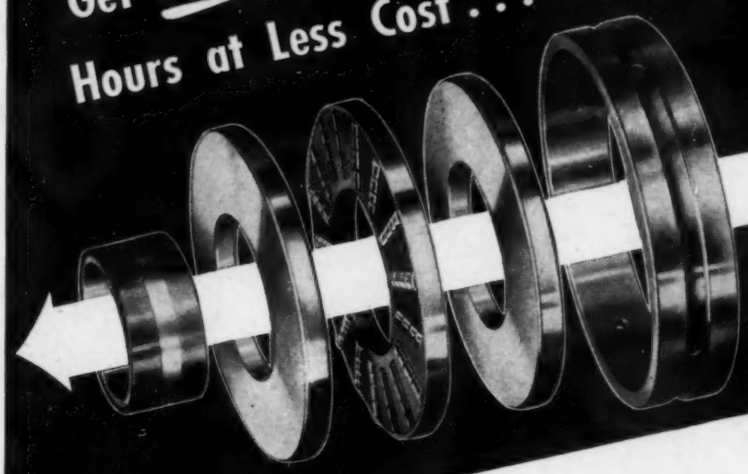
Write today for new descriptive booklet

DEVLIEG JIGMIL

DeVLIEG MACHINE COMPANY

450 FAIR AVE., FERNDALE 20, (DETROIT) MICH.

Get More Man and Machine Hours at Less Cost . . .



ROLLWAY *Right-Angle-Loaded* BEARINGS

Right-angle loading actually means fewer shut-downs...lower maintenance costs...longer hours of machine operation with fewer bearing replacements. These features prove it:—

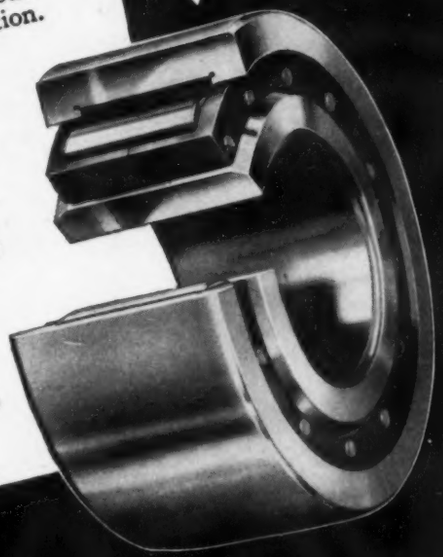
1. Rollway Right-Angle-Loaded Bearings carry all loads at right angle to the roller axis. Hence, they are subjected only to pure thrust or pure radial loads. Compound loads . . . oblique loads and their resultants . . . are not brought to bear on a single bearing.

2. Right-angle loading prevents wedging of rollers and pinch-out. Greatly reduces roller end-rub . . . wear-back and rubbing friction.

3. Permits greater radial or thrust load-carrying capacity in any given dimension.

4. Assures solid cylindrical rollers of greater roller mass and uniform roller cross-section.

5. Assures greater resistance to shock loads and vibration . . . longer life expectancy under continuous heavy-duty service.



ROLLWAY BEARING COMPANY, INC., SYRACUSE, N. Y.

SALES OFFICES

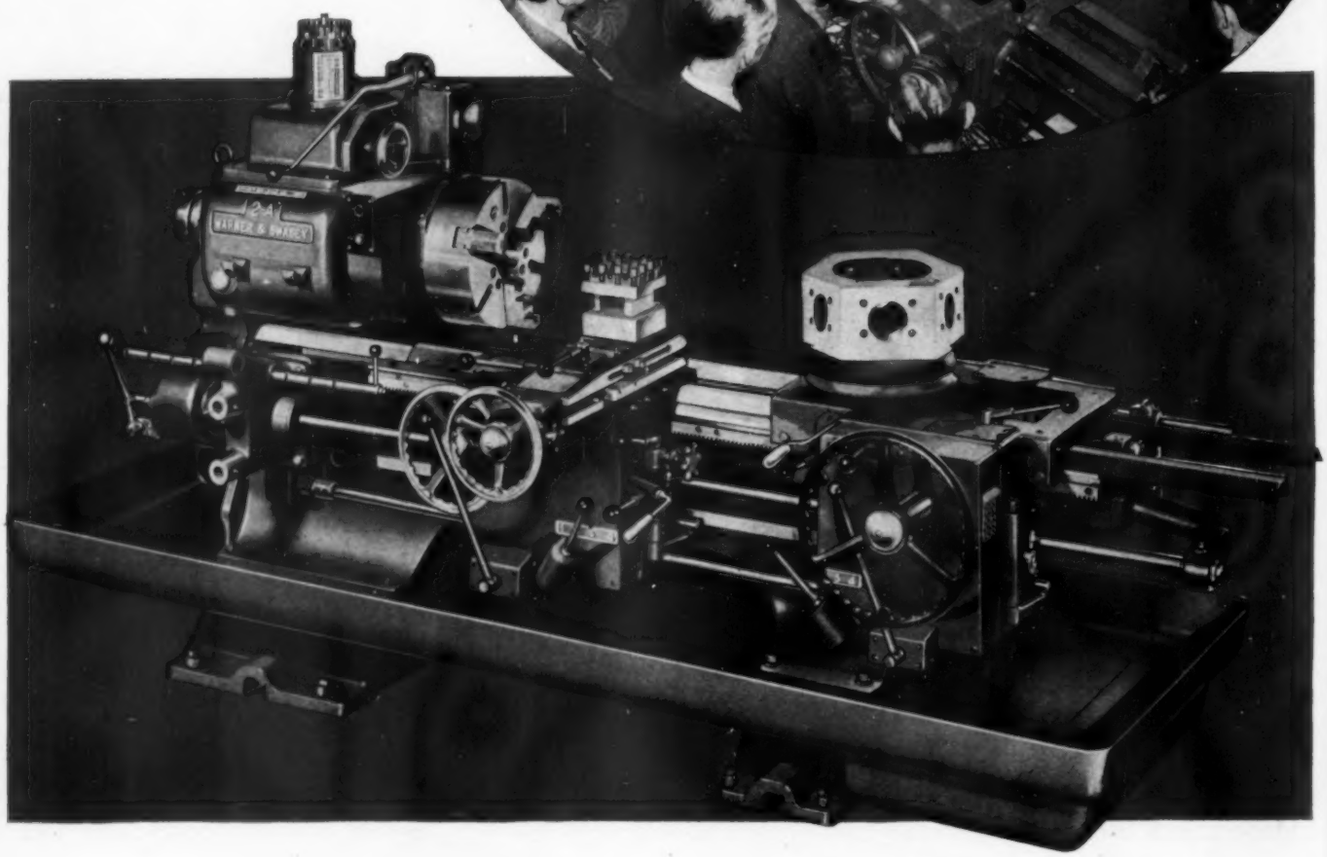
Philadelphia · Boston · Minneapolis · Pittsburgh · Houston · Cleveland · Los Angeles · Detroit · Chicago

FREE SERVICE! Send us a print or detailed statement of your bearing problems. Our engineers will make an analysis and recommend the exactly right bearing for your particular needs.

ROLLWAY BEARINGS

Important New

Demonstrated for the first time at the Machine Tool Show, these new improvements were of keen interest to production men whose operations call for heavy-duty metal turning.



You can machine it better, faster, for less ... with a Warner & Swasey

TURRET LATHES, SINGLE AND MULTIPLE SPINDLE AUTOMATICS,

Features Added to

Warner & Swasey Heavy-Duty Saddle Type Turret Lathes

★ **INDUCTION HARDENED BEDWAYS** for greatest wear resistance; INTEGRALLY CAST with headstock for maximum rigidity. In addition, Warner & Swasey's proven TELESCOPING WAY COVER DESIGN is maintained for extra protection against abrasive matter or accidental damage as well as the washing away of lubricant.

★ **NEW CROSS SLIDE APRON DESIGN** carries a single, convenient lever that provides 4-way rapid traverse of the cross slide . . . longitudinal and transverse. "Feather-touch" lever control shifts power operated clutch for instant positioning with minimum manual effort.

★ **NEW LOCATING AND LOCKING MECHANISM** for fixed center hexagon turrets. Single lever accurately locates and rigidly locks the turret. Double anti-friction taper bearings on the center stud permits easy indexing even with unbalanced tooling. Indexes to .0005".

★ **NEW GEAR BOX DRIVE** operates rapid traverse mechanism, coolant and lubricating pumps. Powered by V-belt drive or individual motor.

★ **POSITIVE AUTOMATIC LUBRICATION** for carriage and saddle.

For information on the many new developments introduced in the Warner & Swasey line of machine tools and accessories, call in your Warner & Swasey field representative or write . . .

WARNER & SWASEY
Machine Tools
Cleveland

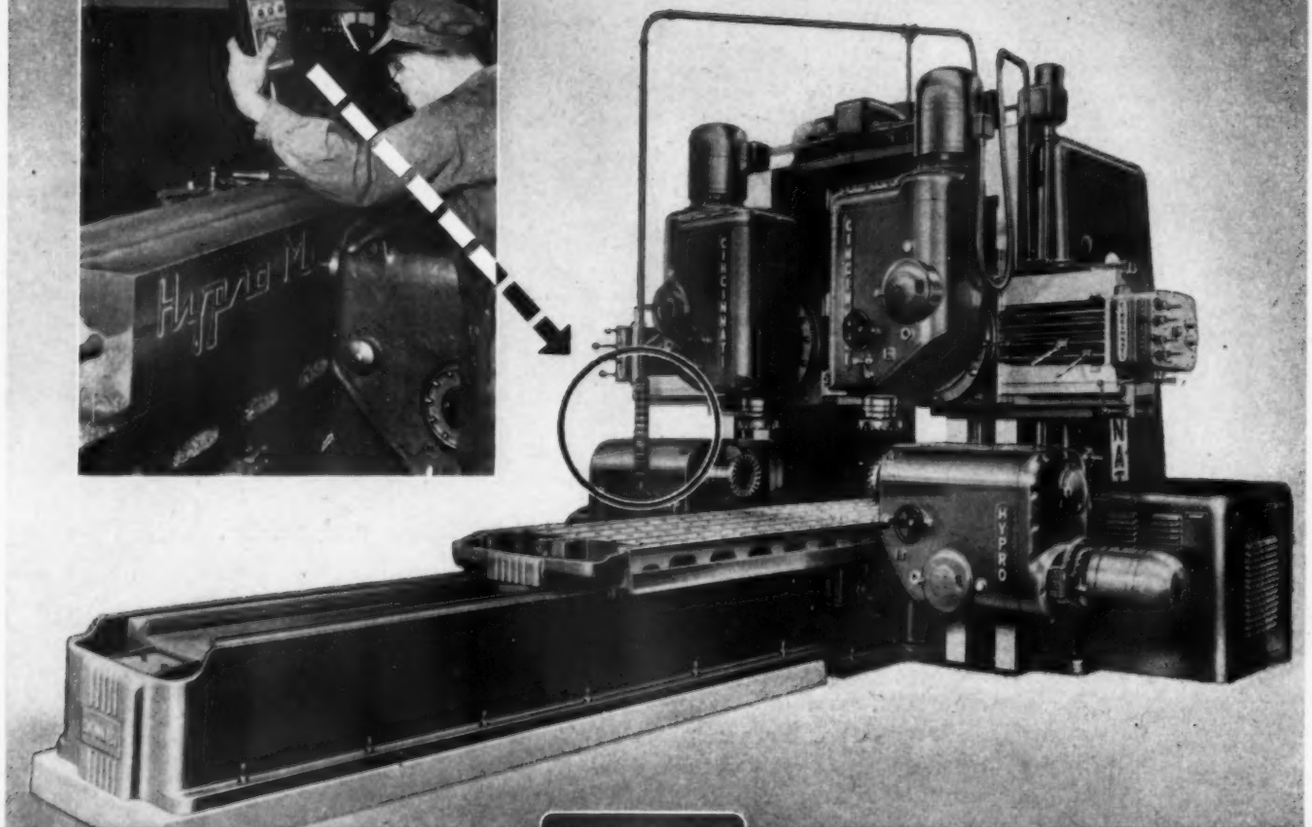
PRECISION TAPPING AND THREADING MACHINES

NOW COMPLETE FINGER-TIP CONTROL FROM PENDANT STATION...

Hypro·electronic

PLANER MILLER DRIVE

Photo on left shows operator milling the words Hypro Miller in cast-iron block — an unusual demonstration of the versatility and absolute control of any head or table from pendant station exclusively.

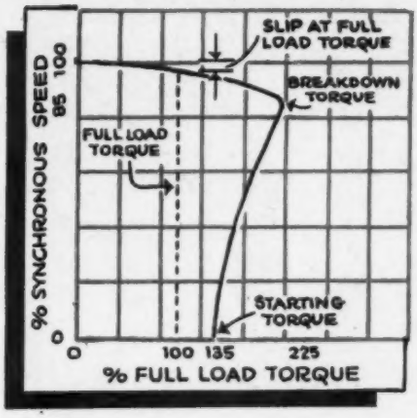


THE CINCINNATI HYPRO PLANER COMPANY

PLANERS · BORING MILLS · PLANER TYPE MILLERS

CINCINNATI, OHIO

Here's One Way to Choose Motors...



Sure, Your Local "Swami" can pick a motor for you in an instant! But if you want motor counsel you can *bank* on . . . you'll consult a reputable motor manufacturer. In place of crystal-ball gazing, he'll advise you to follow *practical* and *orderly* steps in arriving at *right* motor selection. For example . . .

First, Study Your Power Supply . . . voltage, frequency, number of phases; the p.f. required by your utility. Judicious selection will help balance your motor capacity . . . lower power costs. And check the voltage regulation — choose motors with enough torque to start and carry the load. Next . . .

Study the Driven Machine and surroundings. What hp? What starting torque? Will you need a horizontal or vertical motor — direct-connected, belt-driven or gear-operated? How about surroundings — ambient temperature, moisture, corrosion, dust. Each calls for a particular type of protection. Now . . .

Study Your Motor Characteristics. *A-c motors?* For most jobs they're satisfactory and economical. *D-c motors?* For wide speed range; for fast acceleration or reversal they may prove your best bet. *Synchronous motors?* When applicable they give you low-cost p.f. correction. You're *still* undecided? Call in your nearby Allis-Chalmers motor expert. He'll be glad to help you decide—with recommendations backed by 50 years of motor-building!

Wise Motor Choice Saves Power; Ups Profit!

YES, CRYSTAL-BALL GAZING methods are out when you're trying to get *maximum* return on your electric motor investment. Slip-shod selection usually results in over-capacity, high power and maintenance bills — the kind of costs that in the competitive era of tomorrow you won't be able to afford!

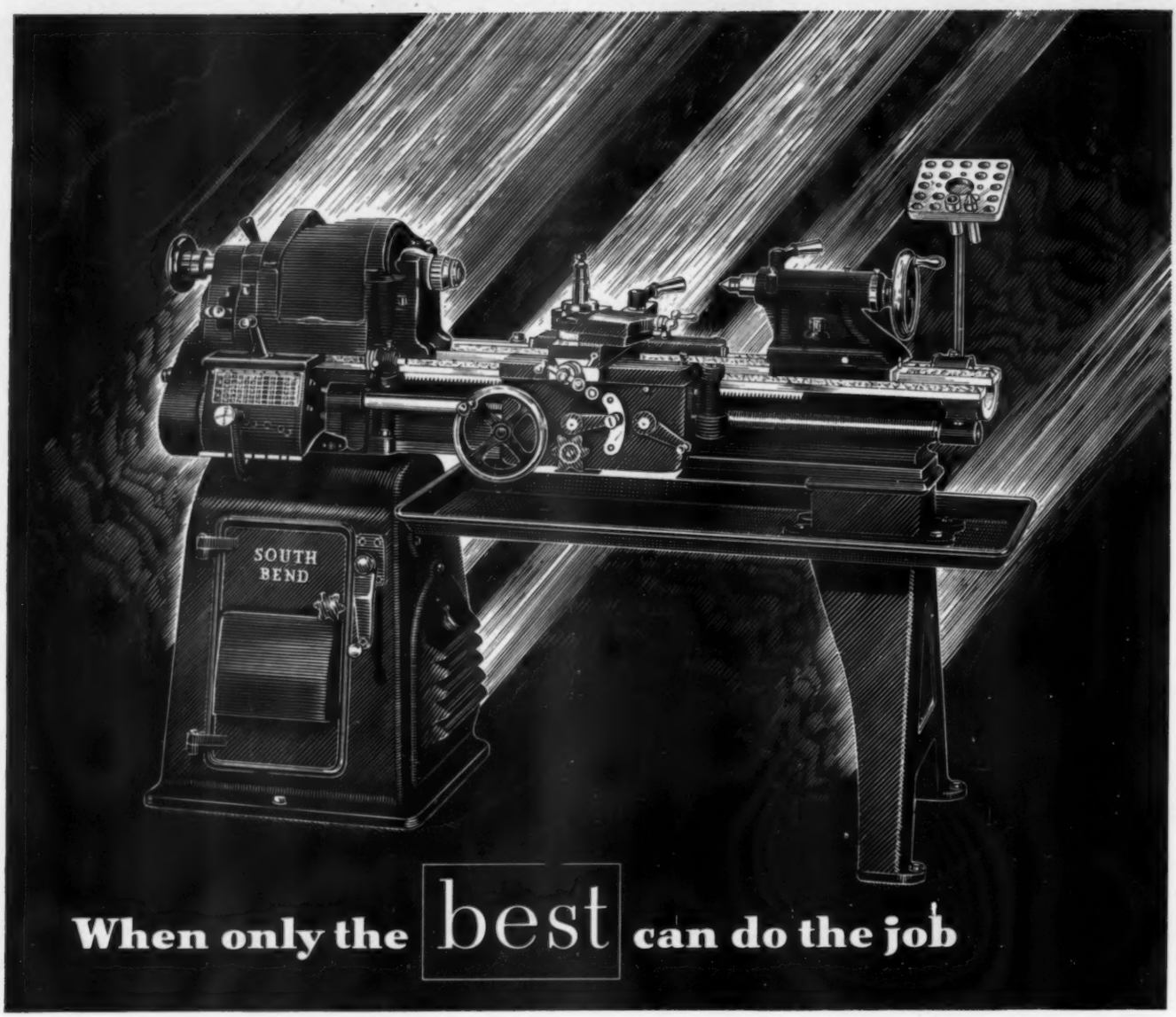
That's why it pays to know more about *all* types of motors . . . their operation . . . limitations . . . maintenance. And there, too, is where your Allis-Chalmers motor expert can be of real help! ALLIS-CHALMERS, MILWAUKEE.

A 2328

1847 1947
A CENTURY OF SERVICE to Industry THAT MADE America Great

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment-
Biggest of All in Range of Industrial Products



When only the best can do the job

There are critical jobs in every toolroom that exact the best in skill and accuracy—that test the mettle of men and machines. It is then, when *only the best* can do the job, that the value of South Bend Precision Lathes is appreciated to its fullest extent.

Toolmakers have long relied upon the dependability of these lathes—their accuracy for close-tolerance machining—their simplified controls for easy operation.

Ask your own toolmakers. They know precision tools and can also tell you in what other ways South Bend Precision Toolroom Lathes can contribute to better craftsmanship on your tools, dies, and fixtures.

Versatility for All Types of Work . . . . . .

South Bend Precision Toolroom Lathes are made with 9", 10", 13" (see top illustration), 14½", and 16" swings. South Bend Distributors in all principal cities—for name and address see "Machine Tools" in classified section of phone book.

Prompt Delivery from distributor's stock or from the factory.

Prices—South Bend Toolroom Lathes from $439.00, f.o.b. factory.

Time Payments—25% down, bal. 12 mo. Low finance charge.

South Bend Lathe Works

BUILDING BETTER LATHES SINCE 1906

419 EAST MADISON STREET
SOUTH BEND 22, INDIANA

Locomotive crank pin gets new start in life

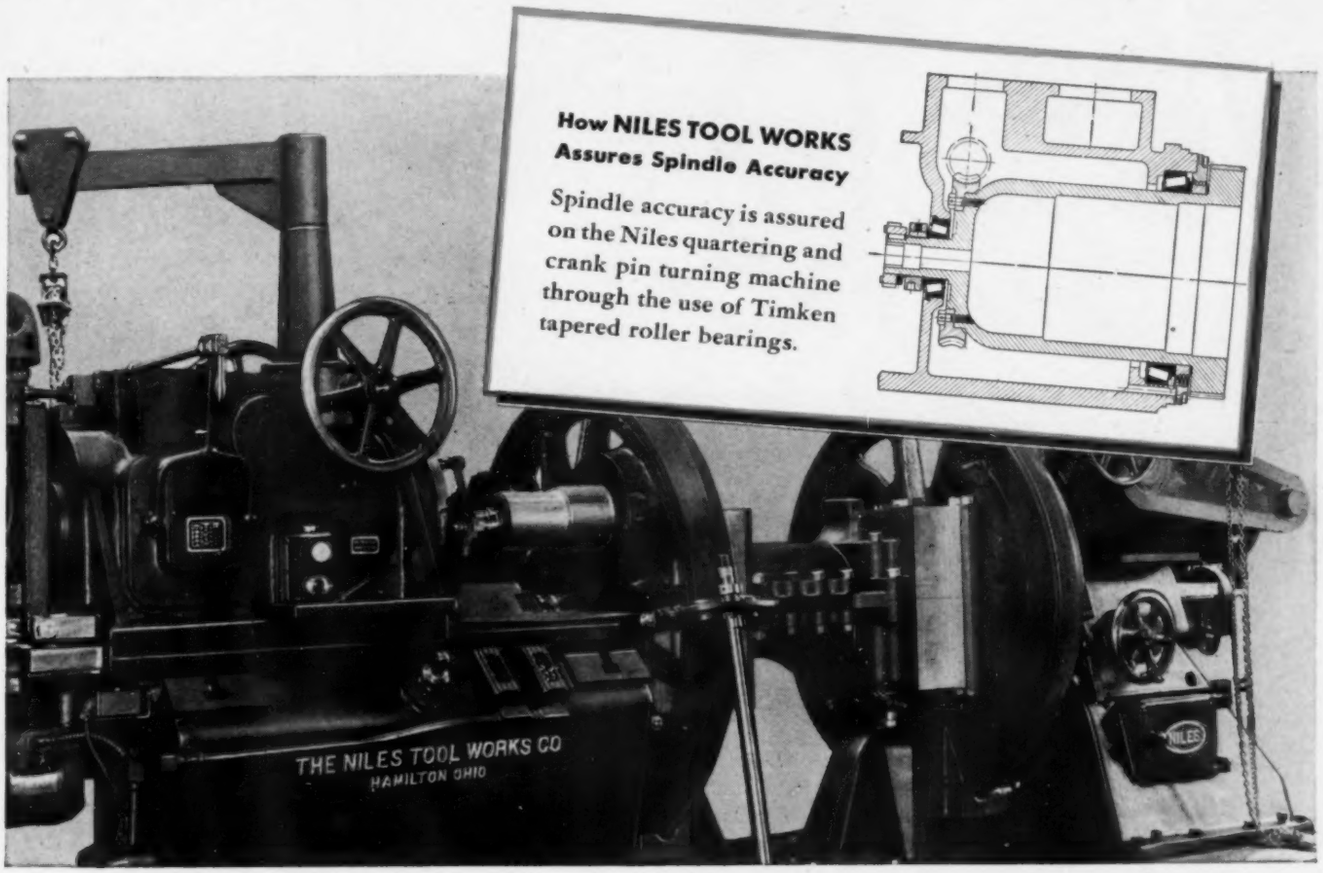
A FAST, effective way to make a worn locomotive crank pin good as new is provided by the Niles 90″ balanced quartering and crank pin turning machine.

To help assure precision of turned crank pins, the spindle is mounted on Timken tapered roller bearings. Timken bearings keep the spindle rigid—make possible accurate machining under all speeds, feeds, and cutting loads.

This is because Timken bearings themselves are precision products, manufactured to exacting tolerances. The tapered construction of Timken bearings permits accurate preloading and close adjustment to retain precision indefinitely. Due to the line contact between rollers and races, and to Timken fine alloy steel, Timken bearings hold up under heavy loads and normally last the life of the machine. Remember, no other bearing can bring you *all* the advantages you get with Timken bearings. Make sure they are in every machine tool you buy or build. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.



How NILES TOOL WORKS Assures Spindle Accuracy

Spindle accuracy is assured on the Niles quartering and crank pin turning machine through the use of Timken tapered roller bearings.

DESIGN LEADERSHIP

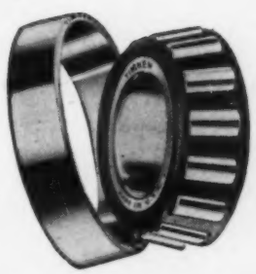
The first Timken tapered roller bearing was produced about 1898. Since then the one-piece multiple perforated cage, wide area contact between roll ends and ribs, and every other important tapered roller bearing improvement have been introduced by The Timken Roller Bearing Company.

The Timken Roller Bearing Company is the only bearing manufacturer in the country which makes its own steel, and leads in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TRADE MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ⟷ LOADS OR ANY COMBINATION

MEN RESPONSIBLE FOR PRODUCTION DEPEND O

● Sound engineering based on long practical experience is responsible for Niagara advanced design resulting in more working strokes per hour with consequent lower costs per piece. Write for catalog.

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, NEW YORK D

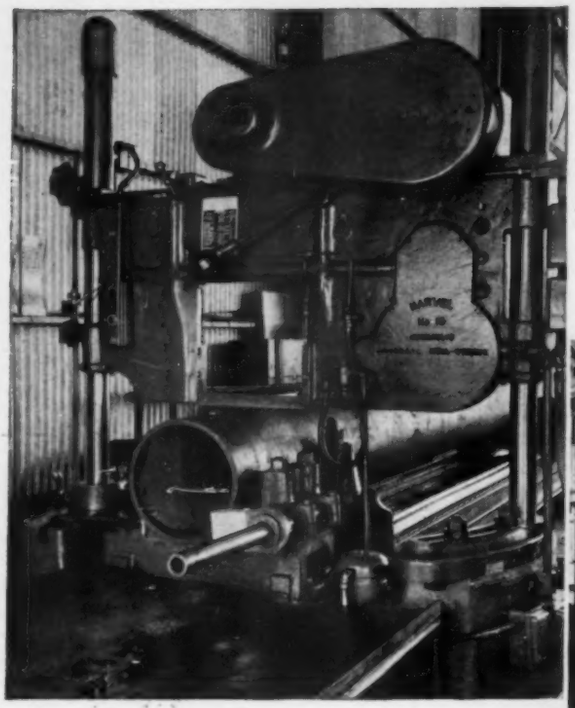
NIAGARA

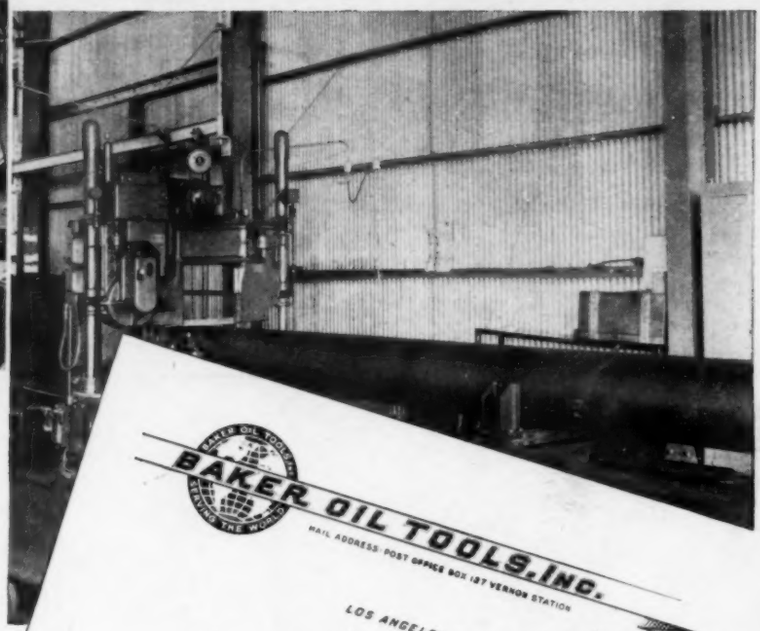
PRESSES
SHEARS

AND OTHER MACHINES
FOR MAKING MORE THINGS
FOR MORE PEOPLE

ORK DISTRICT OFFICES—NEW YORK • CLEVELAND • DETROIT

TUBE CUTTING on a LARGE SCALE at BAKER OIL TOOLS, Inc.





Cutting-off steel tubing, generally considered a slow and costly operation is done quickly and economically, on a large scale, at Baker Oil Tools, Inc. two plants. Really large tubes, up to 18" in diameter are handled on the Giant No. 18 Marvel Hydraulic Hack Saw, illustrated above, quickly and accurately cutting off large steel oil well casing and casing coupling stock. This company also has a No. 6A MARVEL High Speed Production Saw, (capacity 6" x 6") for automatically cutting off single or nested tubes or bars of smaller diameter. Solid stock or tubes, they're all the same to MARVEL Saws.

Whatever your metal sawing problems, there are MARVEL Saws exactly suited to your requirements. Your local MARVEL Sawing Engineer will gladly analyze your problem, make recommendations and quote costs.

Write for Catalog

BAKER OIL TOOLS, INC.
MAIL ADDRESS: POST OFFICE BOX 127 VERNON STATION
CABLE ADDRESS "BACASO"
MAIN OFFICE AND FACTORY
6000 SO. BOYLE AVENUE

LOS ANGELES, CALIF.
August 11, 1947

Armstrong-Blum Mfg. Company
5700 Bloomingdale Avenue
Chicago 39, Illinois

Gentlemen:

We are well satisfied with the results which we are getting from our two Marvel #18 Hydraulic Hack Saws, and from the #6A Marvel High Speed Production Saw. Production time and production costs have been reduced since these machines have been in service.

At the present time we have a #9 Marvel Saw on order which will replace an obsolete machine and we are expecting to again improve our production when it is put into operation.

Your factory representatives have been very considerate and have taken care of our needs quite satisfactorily.

BAKER OIL TOOLS, INC.
C. A. McDonald
C. A. McDonald
Production Manager

MARVEL *Metal Cutting* **SAWS**
Better Machines-Better Blades

ARMSTRONG-BLUM MFG. COMPANY

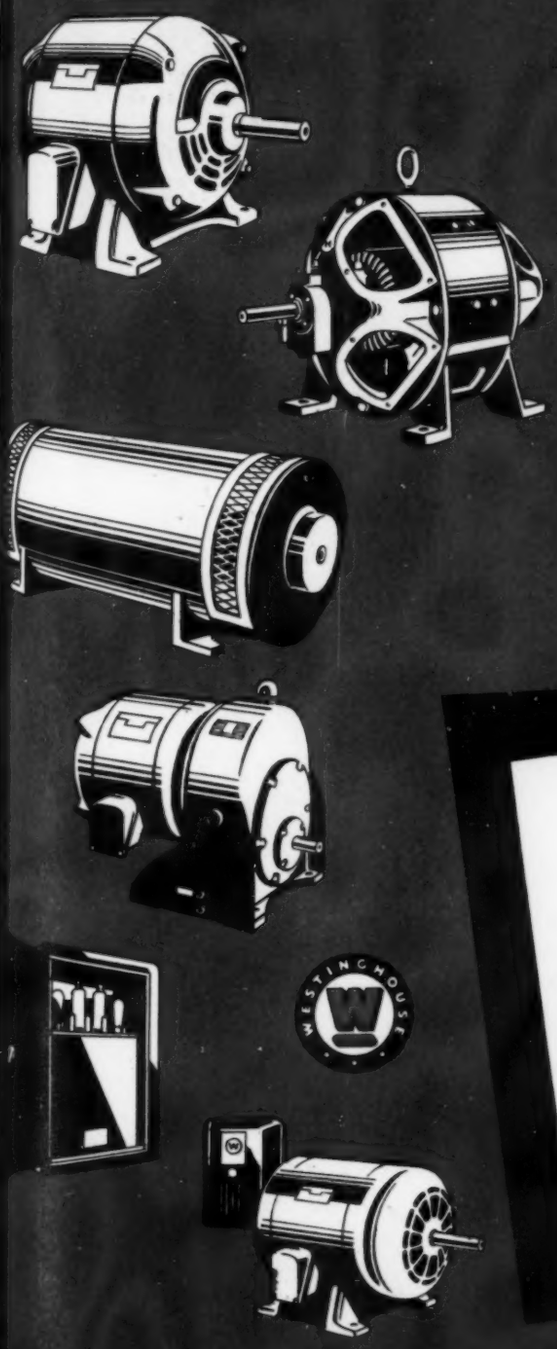
5700 BLOOMINGDALE AVENUE "The Hack Saw People" CHICAGO 39, U. S. A.

6 ways you can use

IMPROVED DRIVE METHODS

to produce

BETTER · FASTER · CHEAPER!



The application of improved drives to existing machines offers many practical possibilities for producing better, faster, cheaper. It involves no heavy investment in new machines or relocation of equipment, and no lengthy training of new operators.

Modern Westinghouse drives and controls—through co-ordinated engineering and application—can perform many timesaving, cost-cutting jobs not commonly credited to such equipment.

On the next two pages you will find proved ways these drives are helping manufacturers cut costs, save time and improve products in typical plants.

Westinghouse

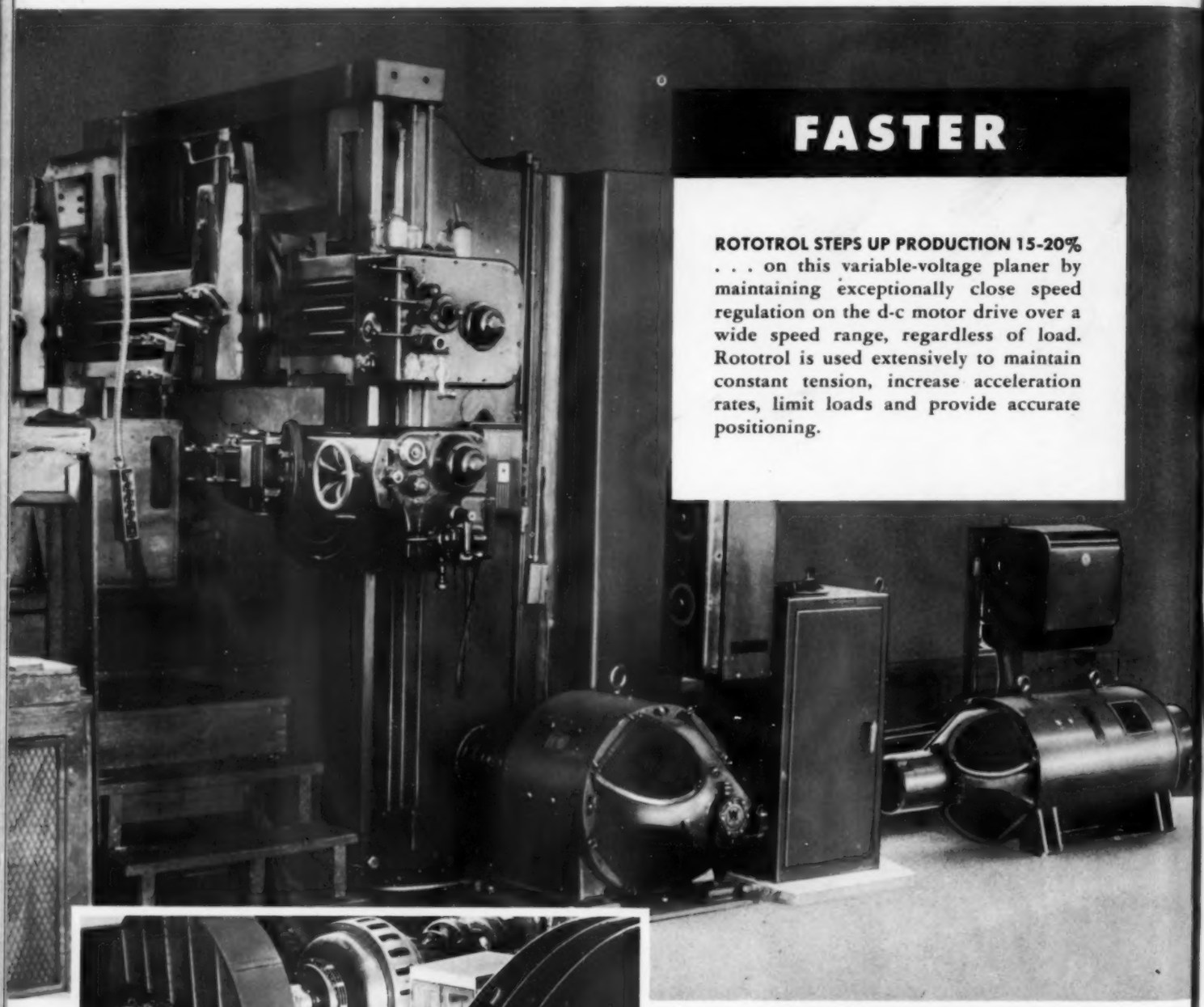
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

FOR ANSWERS TO PROBLEMS LIKE THESE . . .

1. How can Variable-Voltage Drives modernize your control systems to give increased production at lower cost?
2. Does Rototrol offer a means of improving operating performance without the necessity of replacing an entire drive?
3. Are direct-connected Gearmotors the means of reducing your plant operating cost?
4. Is Mot-O-Trol your answer to lower operating costs through more accurate speed control?
5. Would motors that require "no lubrication for 5 years or more" solve one of your costly maintenance problems?
6. How can you improve product quality by proper drive and control selection?

. . . turn the page

Here's how MODERN DRIVE *are being used* TO GET MORE PRODUCTIVE POWER



FASTER

ROTOTROL STEPS UP PRODUCTION 15-20% . . . on this variable-voltage planer by maintaining exceptionally close speed regulation on the d-c motor drive over a wide speed range, regardless of load. Rototrol is used extensively to maintain constant tension, increase acceleration rates, limit loads and provide accurate positioning.

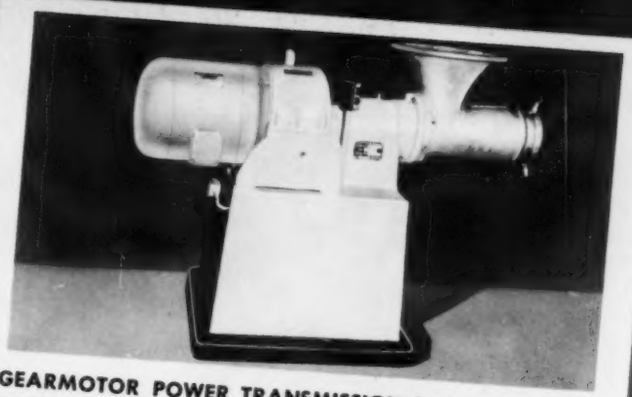
REVERSAL TIME SAVED, ROLLS 38 ADDITIONAL TONS OF STEEL PER HOUR . . . Installation of new exciters, Rototrols and control equipment on this 26-year-old Westinghouse 5,800-hp, d-c motor reduced reversal time to 1.7 seconds.

METHODS

FROM PLANT MACHINERY

Greater precision, compactness, simplification of functions, less maintenance, higher quality of finished product . . . these are important dividends from the sound application of properly-designed drives. Change-over jobs on present equipment may not necessarily involve completely new drives to obtain the advantages of better, faster, cheaper production. The examples shown here are typical of results achieved in scores of plants through alertness to new drive and control developments.

CHEAPER

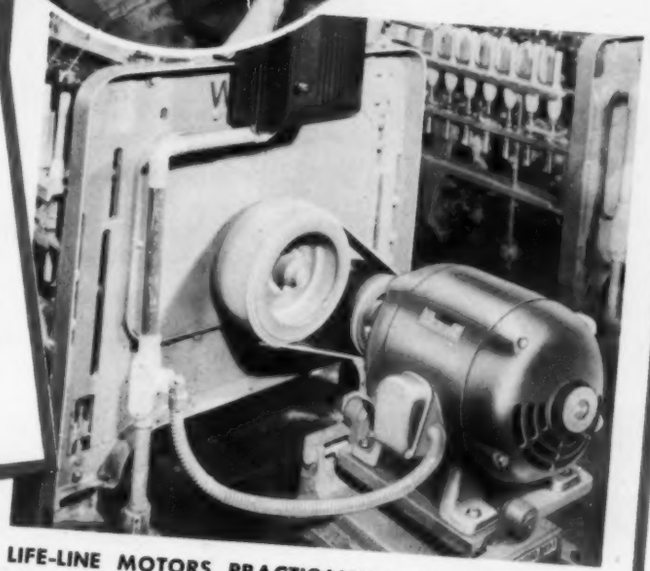


GEARMOTOR POWER TRANSMISSION is from 23% to 38% more efficient than other methods of speed reduction . . . provides power and energy savings up to 10.5%...completely eliminates maintenance costs common with open gearing, belt, chain and rope drives.

BETTER

WESTINGHOUSE MULTI-MOTOR SLASHER DRIVES PROVIDE IMPORTANT PRODUCT ADVANTAGES . . . uniform yarn tension, yarn diameter, beam density; better filler yarn spacing; less yarn breakage; more warp on the beam; fewer stops and adjustments . . . all pointing toward increased production, improved cloth quality and lower production costs. These are typical of the advantages to be gained in many types of production through use of specialized Westinghouse drives.

MOT-O-TROL SHOWED A 3-WAY SAVING on this grinding operation. Setup time was cut, chatter marks were eliminated and the improved drive method *saved 35% in floor space* over the previous cumbersome overhead controls.



LIFE-LINE MOTORS PRACTICALLY ELIMINATE MOTOR MAINTENANCE... Pre-lubricated, sealed ball bearings, requiring no lubrication for 5 years or more, mean no skipped bearings, no overgreasing, no lost pipe plugs and no lost production time due to motors out of service.

FOR MORE PRODUCTIVE POWER...*LOOK TO*

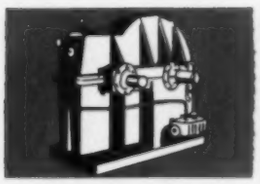
Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

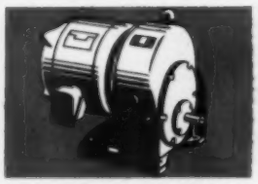
FOR MORE INFORMATION ON HOW TO MAKE POWER MORE PRODUCTIVE
TURN PAGE

FOR ANY DRIVE PROBLEM Westinghouse OFFERS

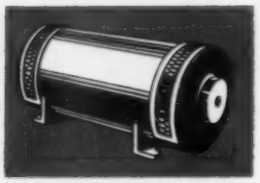
THE RIGHT EQUIPMENT..APPLICATION HELP



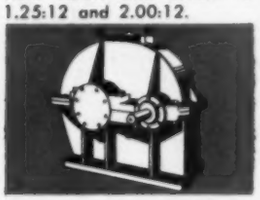
Speed increasers (Type SU) are produced in three basic styles comprising a total of 30 sizes. Small units have nine sizes from 1.25:6.50 to 1.25:-12; large units have 12 sizes from 1.25:9 and 2.00:8 to 1.25:12 and 2.00:12.



Gearmotors are available in three types—Type A, single-reduction with gear ratios from 1.22 to 6.25; Type C, double-reduction with gear ratios from 7.61 to 25.7 and Type E, double-reduction with gear ratios from 31.2 to 58.3.

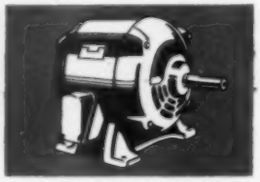


Rototrol for modern control systems where one or more of the following functions are to be controlled: speed, load, torque, acceleration or power factor.

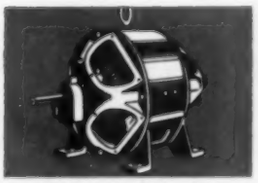


Speed reducers, in single and double-reduction units, have ratios from 2.82:1 to 9.5:1 and 11.8:1 to 70.5:1. All are external-geared type with shafts in horizontal plane.

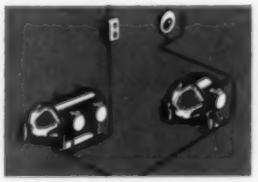
Mot-O-Trol electronic drives provide accurate speed control over a wide speed range from single or three-phase, a-c power. Ratings range from 1 to 10 hp.



Life-Line motors—the greatest advance in motor design in 58 years—are built in 1 to 200-hp ratings, two and three-phase, for voltages of 208, 220, 440 and 550.



D-C motors—Type SK—a complete line of standard sizes, 1 to 200 hp, frames 204 and larger, 115-230 or 550 volts



Adjustable-speed, a-c drives have hp ratings of 1 to 15, inclusive, for 220-440 or 550 volts, 2 or 3-phase, 60-cycle operation. Speed range 10:1.

Combination Linestarters, Class 11-206, provide complete motor and circuit protection in one enclosure for motors up to 200 hp.

APPLICATION ENGINEERING

The how-to-do-it ability of trained Westinghouse engineers is ready to help solve your plant power problems. Co-operative engineering service demands both an aggressive imagination and broad experience in applying basic principles of electricity and allied equipment. Both of these are part of Westinghouse Engineering Service.

RESEARCH

The scope of Westinghouse research reaches into every industry. Wherever power is used and distributed, this research has played an important role in doing jobs better, faster, cheaper.

Westinghouse research facilities are available at any time to help you use the new production tools and apply scientific knowledge in finding practical solutions to production problems.

TRAINING MATERIAL

Westinghouse training material includes not only instruction courses in such subjects as electronics and resistance welding, but everyday help in all phases of the operation and maintenance of modern electrical equipment. This help is available in the form of printed literature and training films. Ask your nearest Westinghouse office for further information.

MAINTENANCE

Westinghouse Maintenance Service, for field and shop repairs, includes a nation-wide chain of 34 Manufacturing and Repair Plants. A skilled corps of specialists located at your nearby Westinghouse office is ready to help you at any time.

RENEWAL PARTS

Parts Warehouses in 29 cities carry genuine Westinghouse renewal parts, and Westinghouse distributors—in addition to their own stocks—can secure parts promptly from any warehouse.

Mail coupon for more information

Westinghouse Electric Corporation
P. O. Box 868
Pittsburgh 30, Penna.

Please send me more information on the following products:

- ☐ Speed increasers
- ☐ Speed reducers
- ☐ Gearmotors
- ☐ Mot-O-Trol
- ☐ Rototrol
- ☐ Life-Line motors
- ☐ D-c motors
- ☐ Adjustable-speed, a-c drives
- ☐ Combination Linestarters

Name_____ Company_____

Title_____

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J-90572

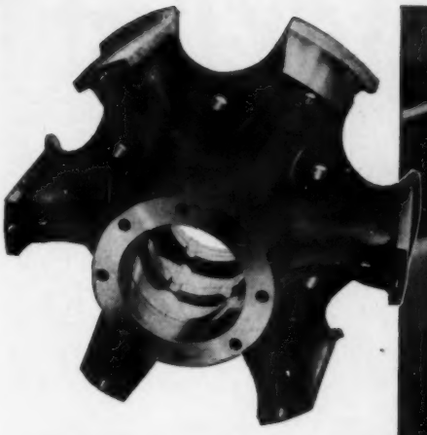
PRODUCTIVE POWER

Litho in U.S

5,000 Holes per day

with CLE-FORGE HIGH SPEED DRILLS

TRADE MARK REG. U.S. PAT. OFF.



Three multiple spindle set-ups, one of which is illustrated at the right, are employed to drill the 20 holes in this cast steel truck wheel. An average of 250 wheels are drilled each day—a total of 5,000 holes. CLE-FORGE High Speed Drills are given much of the credit for maintaining this production rate.

This job is typical of many where CLE-FORGE High Speed Drills have demonstrated their superior performance. Because these drills produce *more holes per grind,* they are an important factor in reducing "down time" and increasing output. If you have not already used CLE-FORGE High Speed Drills and experienced their many advantages, we urge you to . . .

Telephone your I INDUSTRIAL S SUPPLY D DISTRIBUTOR

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49TH STREET
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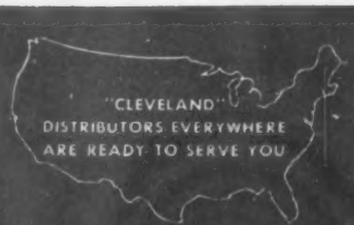


Get These 7 Features in Your Automatic Lathe--for Low-Cost Turning of BOTH Short and Long Runs

Many manufacturers are now getting the advantages of multiple tooling and automatic cycling on short-run, as well as on mass production turning . . . with Sundstrand Automatic Lathes.

The following seven important design features of these Automatic Lathes will make it possible for you to obtain these same benefits:

(Above) Quick set-up for short runs is accomplished by simply adjusting dogs on a graduated disk. No cycle control cams are required.

1. QUICK CYCLE CHANGEOVER

So the adjustments for various sizes and types of parts can be made rapidly with a minimum of down-time.

2. SIMPLICITY OF TOOL ADJUSTMENT

So that operators or set-up men can readily learn to make tool set-ups and changeover.

3. WIDE RANGE OF CARRIAGE CYCLES

Easily adjusted for many different sizes of parts and types of tool uses.

4. WIDE FEED AND SPEED RANGE

Suitable to cover a wide range in size of parts to be machined.

5. ADEQUATE HORSEPOWER

So that multiple tooling can be used to shorten cutting time; also so that cemented carbide and other modern cutting tools can be used to capacity.

6. AUTOMATIC CYCLING

For accurate duplication to close limits of all parts in the lot. Also so that operator can, on occasion, run more than one machine.

7. HIGH RAPID TRAVERSE RATE

So that cutting tools can be advanced to the cut and returned after the cut in the least possible time.

SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U.S.A.

RIGIDMILS • FLUID SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT

SUNDSTRANDS Have These Features for Work in Any Lot Size

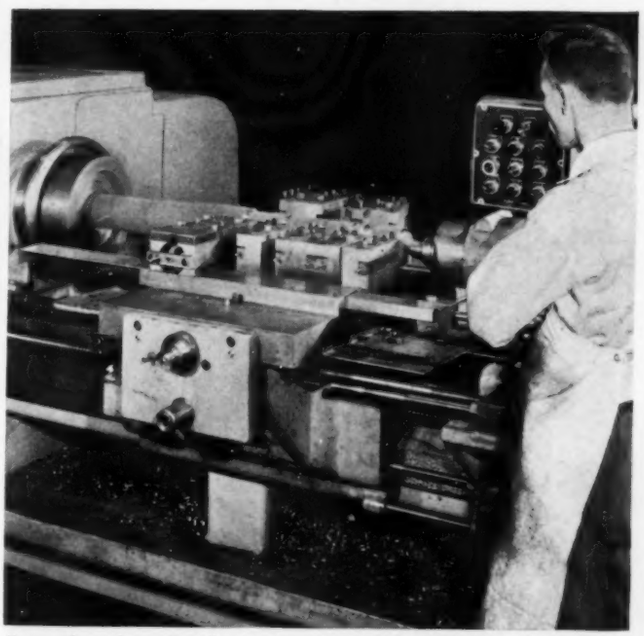
Yes, all of the seven foregoing features are included in each Sundstrand Automatic Lathe. Probably of greatest importance of these features is the quick cycle changeover. It makes it highly practical to include short runs on multiple tooled jobs. On an average job, using five tools, a Sundstrand can be set up in less than thirty minutes.

...in Machines Ranging in Capacity up to 17½" Swing

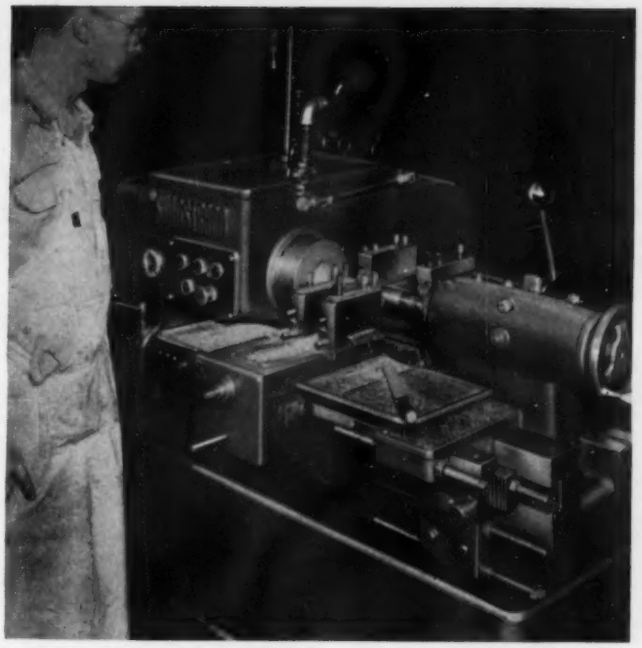
The complete line of Standard Sundstrand lathes consists of the Models 4, 8, 10, 12 and 16. In addition, center drive lathes and special lathes can be furnished to suit special job requirements.

...within Range of 3 to 75 Horsepower

You'll find plenty of horsepower for your tougher jobs or a horsepower range to suit your work in Sundstrand Automatic Lathes. The complete line of five machines embraces a horsepower range of from 3 to 75 h.p.



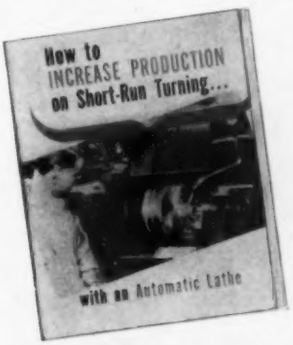
Operation view of 75 horsepower Sundstrand Model 16 Automatic lathe turning one end of a steering clutch shaft.



Operation view of Sundstrand Model 4 Automatic lathe. Machine has a maximum swing of 9½" diameter and a rapid traverse rate of 300" per minute on the front carriage.

Free Additional Proof

Over 20 different turning jobs are described in this 44 page booklet. You will find valuable production data to compare with your present equipment. Short-run, mass production and special turning jobs are all described in detail. Write for your copy today. Ask for Booklet No. 165. For a preliminary analysis send blueprints and production requirements.



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The new Red Ring Model GCU Diagonal Shaving Machine has been developed especially for mass production. While the principle of Rotary Crossed Axes shaving which has proved itself over the years is retained, an entirely new method of its application provides a number of advantages in production operations. Some of these are:

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7. Better control of lead angle on helicals.
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10. Operator's haste cannot jeopardize tooth surfaces.
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2523

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SPECIALISTS ON SPUR AND HELICAL INVOLUTE GEAR PRACTICE • ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

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Speed up assembly time with ADAMS custom made gears

Experience has proved that gears made *especially* for the job can often simplify and speed up assembly. Custom made gears can be designed with assembly problems in mind and save hours and dollars out on the assembly floor. While your product is still on the boards, plan on using Adams precision-made gears—built by craftsmen, *exactly* to your specifications. THE ADAMS COMPANY, 1942 Bridge Street, Dubuque, Iowa.

The ADAMS Compa
Dubuque, Iowa, U. S. A.

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FINE GEARS MADE TO YOUR SPECIFICATIONS . . . ESTABLISHED 1882

KEEP PRODUCTION at PEAK EFFICIENCY

...with Cutters like this

BECAUSE of the alternate right- and left-hand spiral angles of the teeth, with considerable angle of undercut, this staggered tooth side milling cutter is removing a large amount of metal without destructive vibration and chatter . . . taking deep cuts with *good finish*. Its free cutting action makes possible an increased speed and feed.

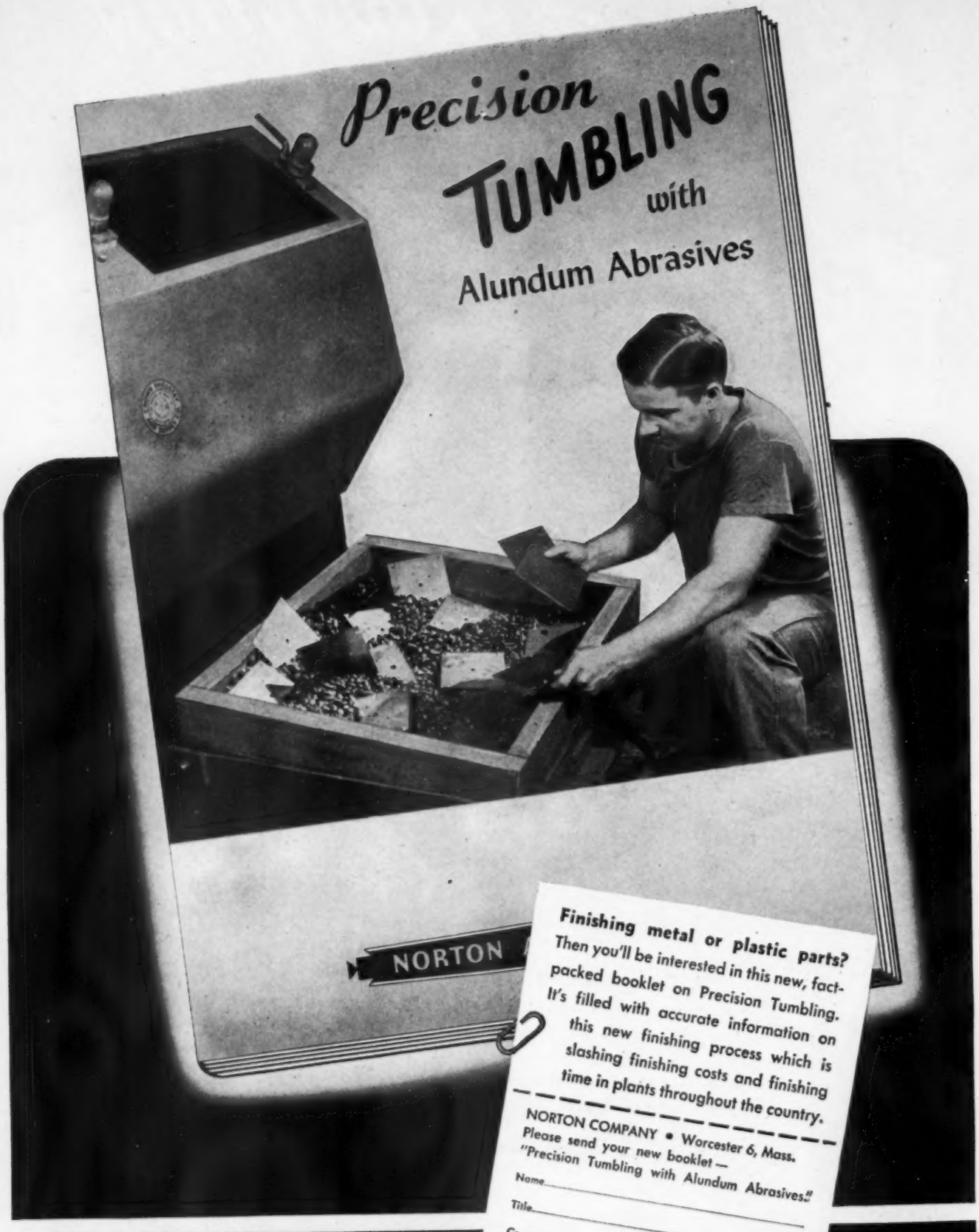
This is a typical example of the many installations where the inherent high qualities of Brown & Sharpe cutter design and craftsmanship pay dividends. Write for catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

A Complete Line of MILLING CUTTERS

Plain Milling Cutters — Helical Plain Milling Cutters — Side Milling Cutters — Staggered Tooth Side Milling Cutters — Inserted Tooth Cutters — End Mills — Angular Cutters — Convex and Concave Cutters — Metal Slitting Saws — Screw Slotting Cutters — Sprocket Wheel Cutters — Gear Cutters

We urge buying through the Distributor

BROWN & SHARPE CUTTERS B·S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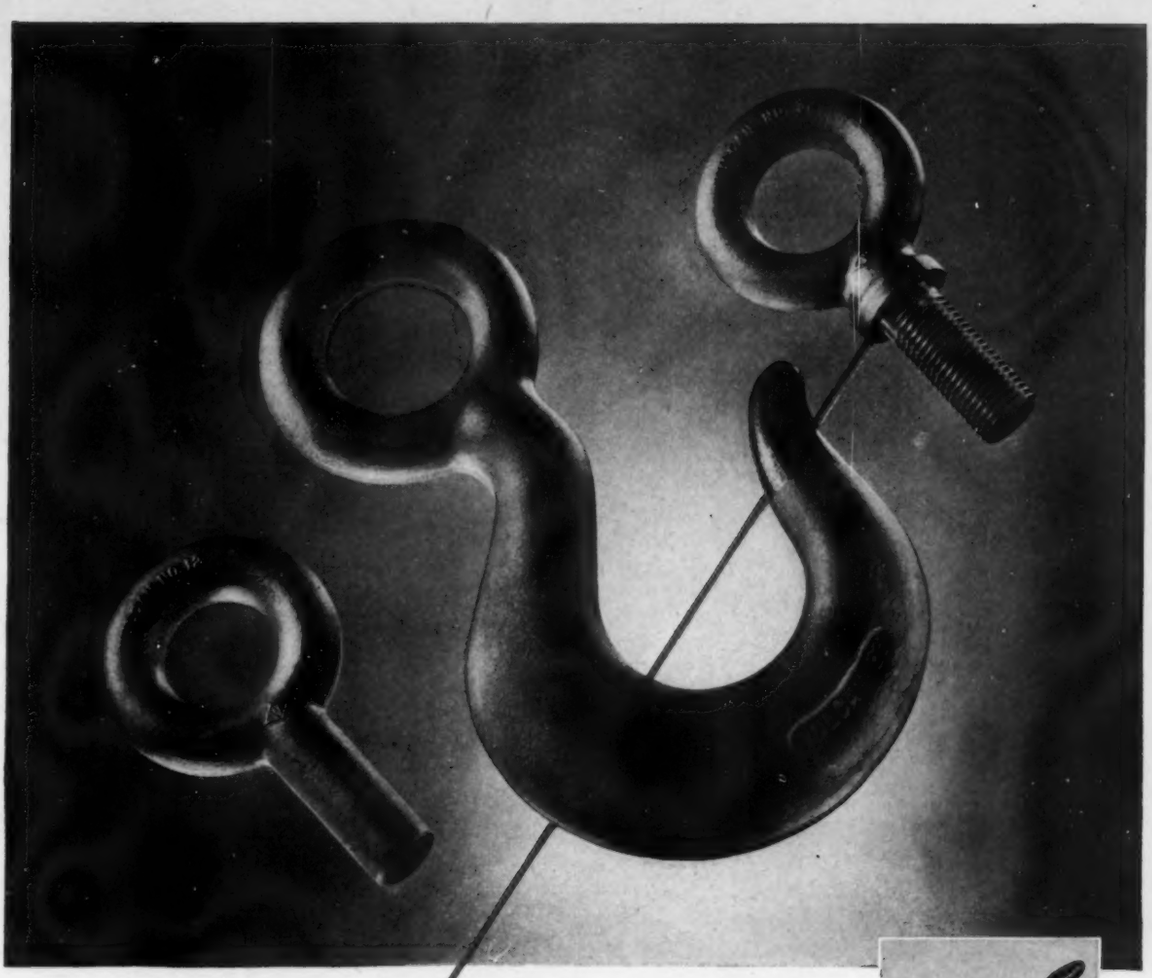

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FOR SAFE PERFORMANCE

Not only are Williams "Vulcan" Hoist Hooks and Eye Bolts drop-forged from selected steel and specially heat-treated to provide maximum strength and toughness, but every "Vulcan" is *individually proof-tested to 50% beyond* its rated "safe working load." Each item so tested is stamped with a certifying mark. All guesswork is eliminated when you specify Williams "Vulcan" Hoist Hooks or Eye Bolts.

You can identify "Vulcan" Hooks by their orange tip. Sold by leading Industrial Distributors everywhere.

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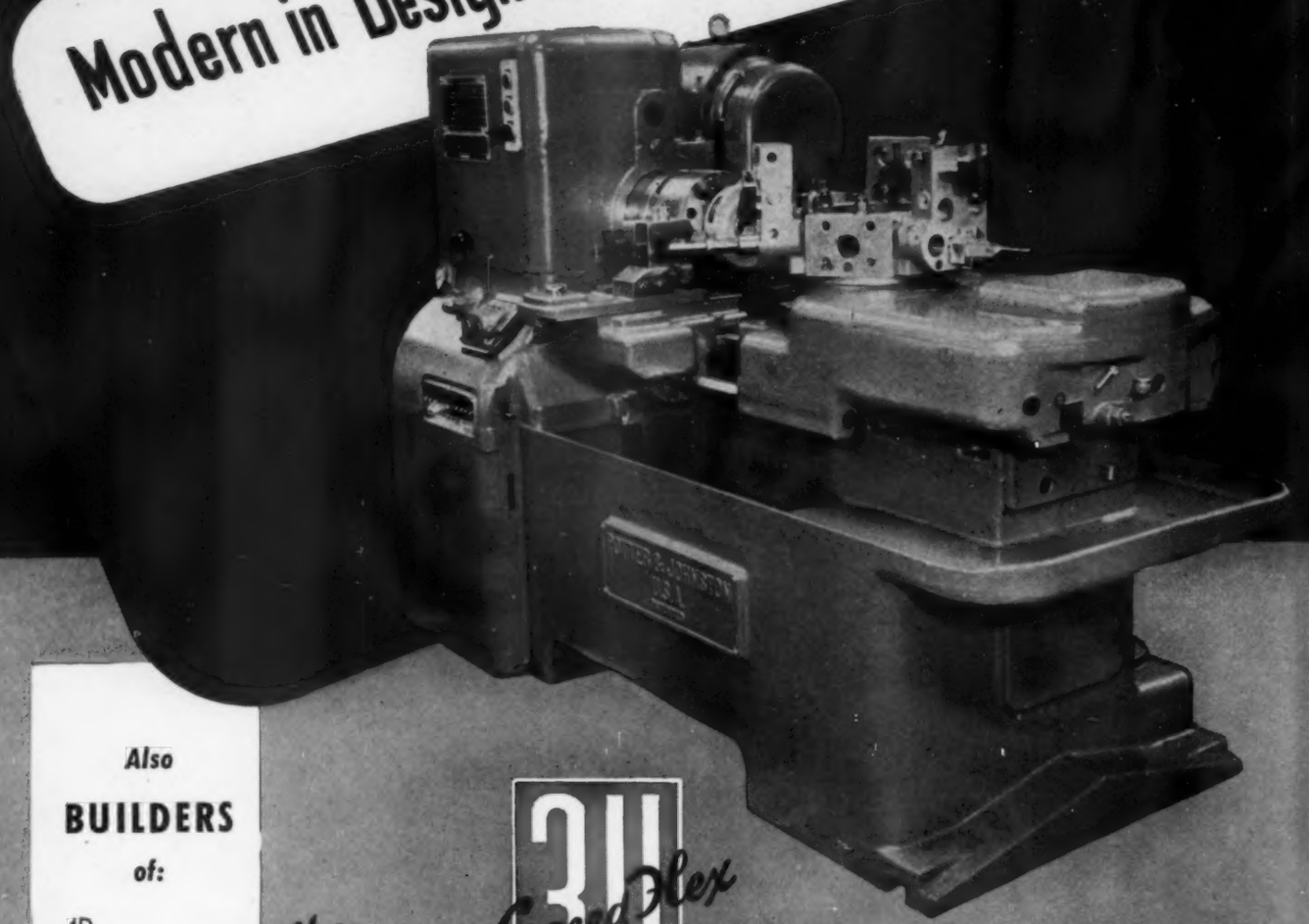
DROP-FORGINGS AND DROP-FORGED TOOLS

Modern in Design and Performance



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11 Models with 4, 5, 6 turret faces. Optional.

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The NEW 30 *SpeedFlex* P&J AUTOMATIC TURRET LATHE

. . . an entirely new size for small work featuring:

. . . Modern Rigid Construction.
. . . Anti-Friction Bearings for mounting all high-speed shafts and spindle.
. . . Hardened and ground steel ways for turret slide are mounted on base.
. . . Hardened and ground steel inserts in turret slide.
. . . Gearing of chrome vanadium steel, heat treated and shaved.
. . . High Spindle Speeds: standard 73 to 1445 R.P.M. optional dual range 36 to 711 R.P.M. and 73 to 1445 R.P.M.
. . . Four automatic changes of speed with each set of hand pick off gears.
. . . Three automatic changes of feed with each set of hand pick off gears.
. . . Multiple disc clutches employed for speed and feed changes.
. . . Ample power and speed for use of tungsten carbide tools.
. . . Electro-Pneumatic control of speed and feed changes and rapid traverse.
. . . Split-second timing . . . 1/5 second for change from rapid traverse to feed and vice versa.
. . . Turret Slider can drop from rapid traverse into feed for ¼" travel and return to rapid traverse in 2 seconds under set up conditions of top speed and 10 thousandths feed per R.P.M.
. . . Rapid Traverse movement of turret slide and cross slides for one *complete cycle* of machine in 24 seconds.
. . . Rigid turret slide; turret automatically clamped in position after indexing; indexing by Geneva motion.
. . . Turret alignment with spindle accomplished by a locking and binding wedge.
. . . Safety cut out switch in case of air failure.
. . . Automatic stop at completion of work cycle.
. . . Full electrical controls.

Write for detailed specifications

POTTER & JOHNSTON MACHINE CO.,

Pioneer Manufacturer of Automatic Turret Lathes

PAWTUCKET, RHODE ISLAND

Put it on the Blanchard

For a saving of *10* hours on each milling machine universal saddle

FORMERLY the two halves of this cast iron milling machine universal saddle were scraped together—an 11-hour operation.

The size is not important on this job. But the finish *must* be good and the ground surface *must* be flat and parallel with respect to the ways, within .0003 inch.

now: To eliminate the laborious and costly scraping-in of the two halves of the saddle, each half is now set on parallels and ground on the 36-inch chuck of a No. 18 Blanchard Surface Grinder. The illustration shows the top half of the saddle set up for grinding.

Each saddle half is now Blanchard-ground in 25 minutes — to fully and easily meet the rigid specifications. The 50-minute total for this job represents a SAVING OF MORE THAN *10* HOURS per saddle.

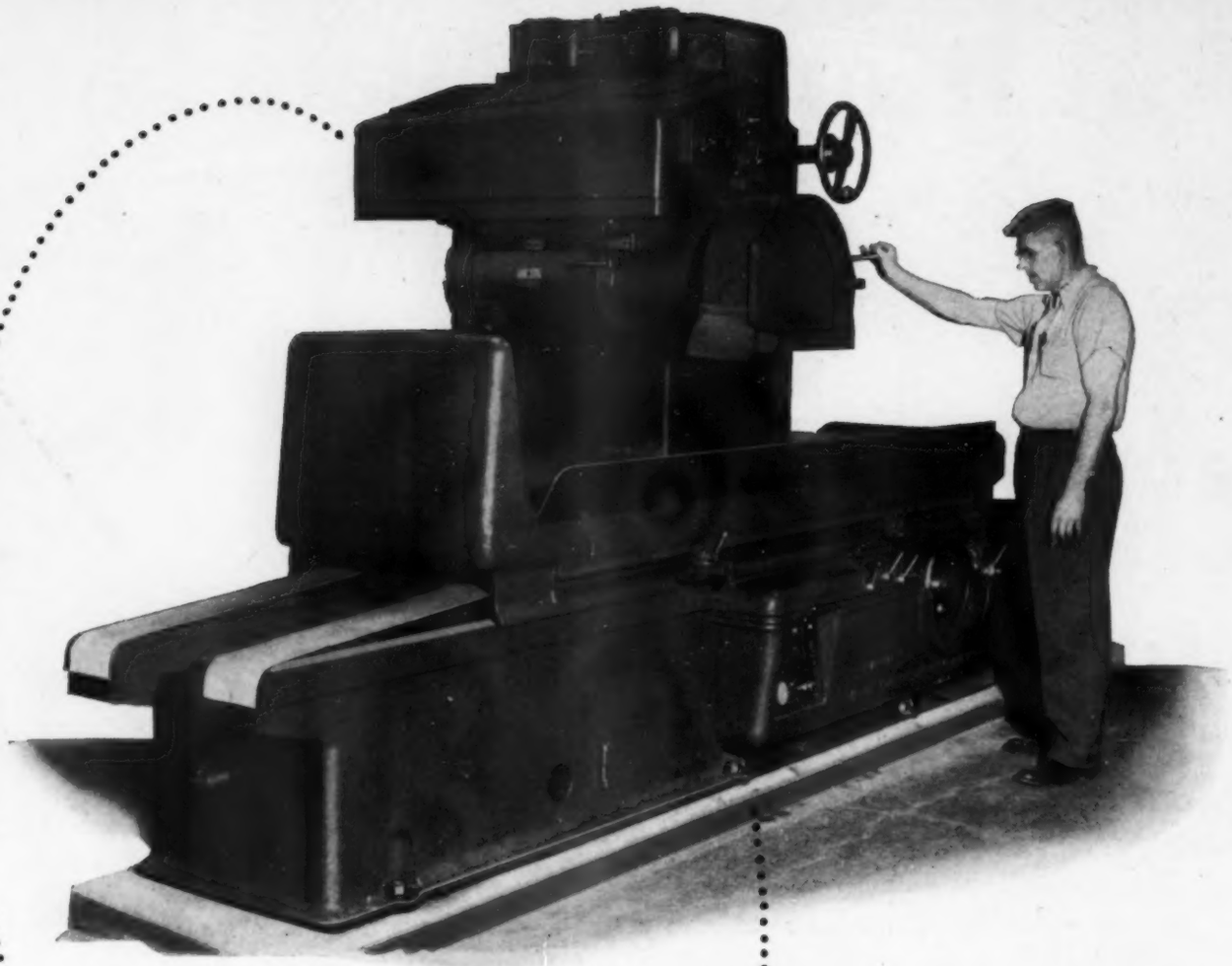
It will pay you to investigate whether you are producing flat surfaces at a much greater cost than necessary. Our Consultation Service will gladly help you with advice, reliable production data, fixture design if necessary and sample grinding. Simply send us the data—including prints and, if practicable, samples. You will incur no obligation.

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.



50% Reduction in Cost *PLUS* Greater Accuracy

The user of this HILL Open Side Horizontal Spindle Surface Grinder reports:—"Savings of 50% over previous methods used in finishing jigs and fixtures. Tolerances within .0003" are held with ease." ● Similar results are not unusual and can be expected as normal performance on practically all kinds of periphery grinding applications. ● Hill Open Side Hydraulic Surface Grinders are built in both Horizontal Spindle and Vertical Spindle types with a wide range of table sizes in each type.

THE HILL ACME COMPANY

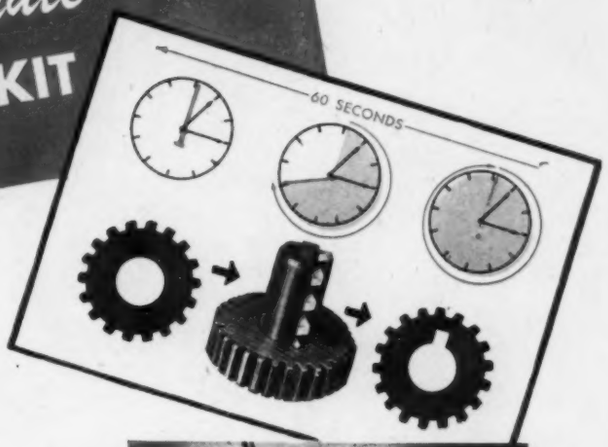
6400 BREAKWATER AVENUE • CLEVELAND 2, OHIO

"HILL" GRINDING AND POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING THREADING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES

HAND CUT YOURSELF A KEYWAY A MINUTE

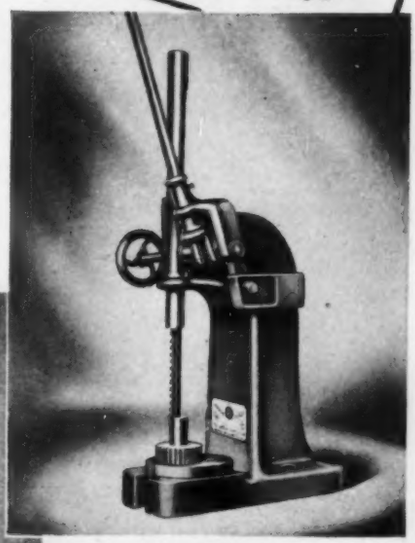
In Gears, Pulley Hubs, Couplings, Collars, Milling Cutters, etc.

With du Mont's *Minute Man* KEYWAY BROACH KIT



Think of the time and trouble and money you'll save when you have this Minute Man Kit handy to cut keyways of any standard width, any depth. A few keyways jobs and the Kit has paid for itself.

Here's a set of fine tools that no shop can afford to be without. Deliveries are now being made from stock. A postcard with your name and company address will bring you the name of the nearest Mill Supply Distributor and a free copy of the new *Minute Man* Catalog, Price List and Reference Manual "A".



All you do is drop the right size bushing in the bore, insert the broach and press it through, using a shim and second pass to get the exact depth desired. In sixty seconds or less you have a clean, accurate keyway.

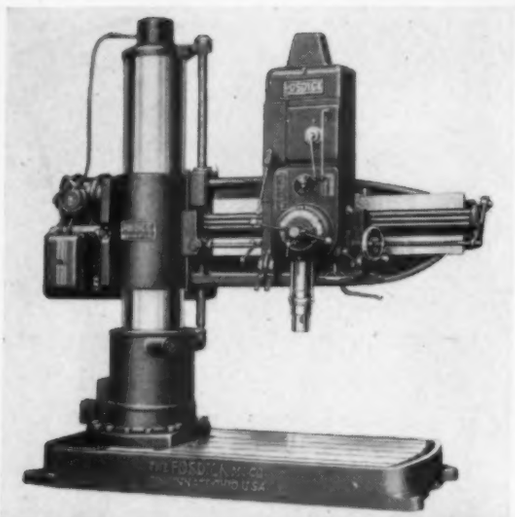
The du Mont Arbor Press, pictured, is ideal for the job and for many other shop uses. It comes in sizes for 2, 3, and 5 ton pressure.

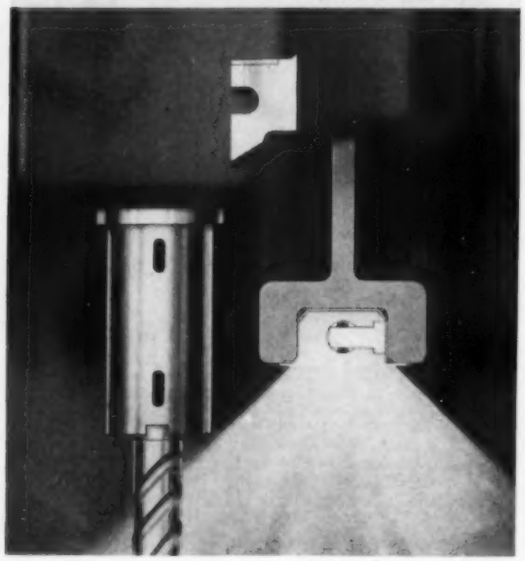
Kit contains everything you need to cut up to 32 different size keyways — precision broaches, bushings, shims, keyway stock.

The du MONT CORPORATION

GREENFIELD, MASSACHUSETTS

2 of the new features of FOSDICK RADIALS





1 Fosdick Tool Ejector saves time—wear and tear on tool shanks—eliminates possibility of eccentric drilling.

All Fosdick Radial Drill spindles are furnished with Morse tapers and the customary procedure is to use a drift hammer to release tool. This practice often burrs the shank and causes tool to run eccentrically. With the new Fosdick Radials operator merely grips tool in one hand, raises spindle to extreme position with the other and tool drops right in his hand. There's no time lost searching for a drift and a hammer and no possibility of damaging tool shank. Operators like it—and you'll like it too when you see how it reduces handling time.

2 Fosdick Electric Light in the Radial Drill Arm provides ample light for all operations, assures greater accuracy.

A "U" section is cast in the bottom of all Fosdick Radial Drill Arms and a Fluorescent tube is inserted. Thus, ample light is provided on all operations, close to the work, with the head in any position on the arm.

•

These are but two of many new developments on Fosdick Radials. For detailed information ask for Radial Drill Bulletin R.A.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

Shop uSet MTT . . . 35 blocks giving 140,000 combinations in tenthousandths. Price in mahogany case, $100.00.
Economy Set MT . . . Over 5000 combinations in thousandths. Price in mahogany case, $40.00.
Micrometer Set M21 . . . Includes 1", 2", 3", 4", 5" and 6" Microgages. Price in mahogany case, $60.00.
Toolmakers Set M64 . . . Gives 121 combinations in 16th., 32nd and 64ths. Price in mahogany case, $17.50.

THE NEW VAN KEUREN 7/8" DIAMETER MICROGAGES, ...*are the best buy*

60% more wearing surface . . . 25% greater accuracy . . . Body true cylinders . . . Ends square with body . . . No increase in price

A FOUNDATION FOR ACCURACY FOR 25 YEARS

Van Keuren Microgages have been popular for over 25 years, because they provide a low cost means of securing accuracy in the shop, to meet the demands of the inspection department.

The original Microgages were made 11/16" in diameter. The ⅞" body diameter of the NEW Microgages are ground true cylinders, and the end surfaces are held square with the body within close limits. This enables them to be easily aligned on machine ways for measuring carriage travel. The new Microgages have 40% more wearing surface than rectangular gages and they wring together tenaciously. The ⅞" diameter body provides excellent rigidity for the 6" long blocks.

Microgages up to 1" length are held within a tolerance of plus 12 millionths minus 8 millionths. They have an average wear allowance of 4 millionths oversize. They are available as individual gages from .0625" to 6" length, or in sets especially designed for general shop use, for tool setting and for tool makers and machinists.

THE *Van Keuren* CO., 176 WALTHAM STREET, WATERTOWN, MASS.

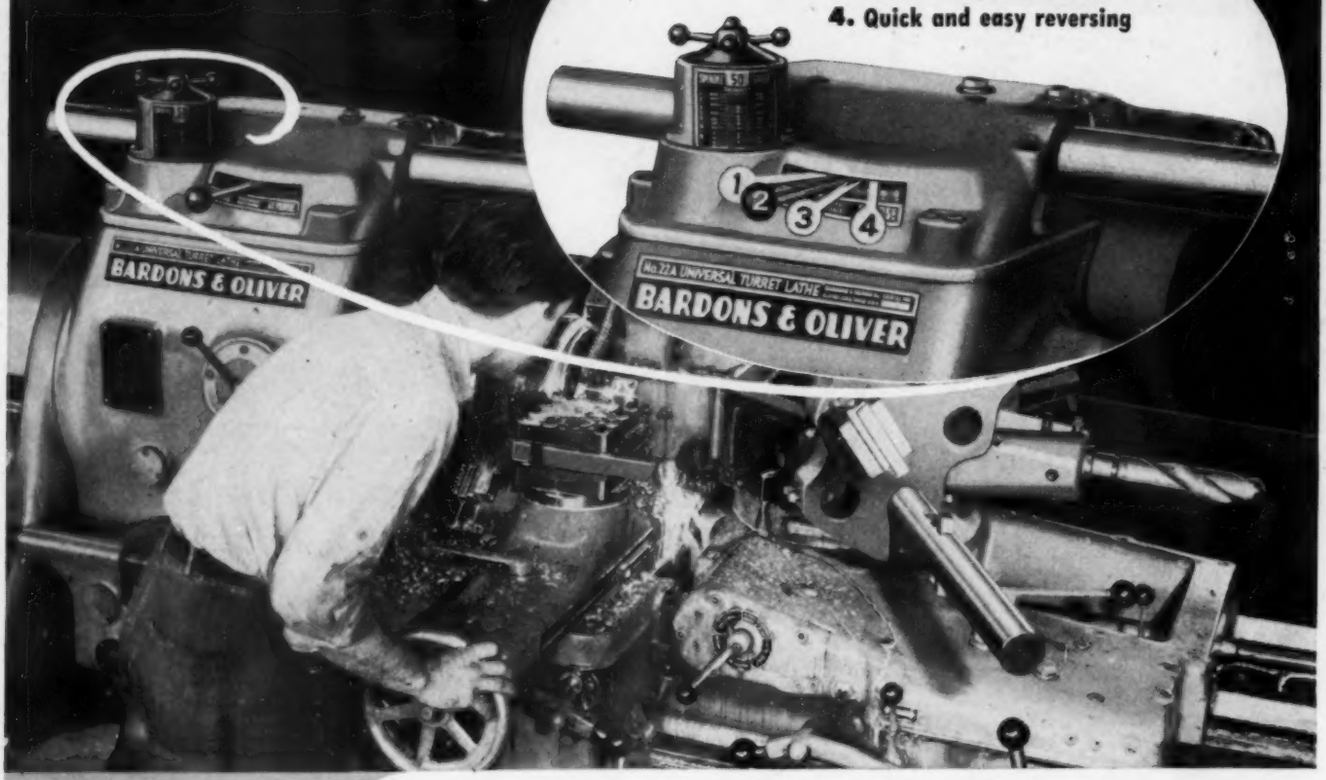
29th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

Anti-Clash Hydraulic Governor

PERMITS INSTANT SPEED CHANGE!

1. Effortless starting
2. Anti-Clash Automatic Gear shifting
3. Powerful spindle brake
4. Quick and easy reversing



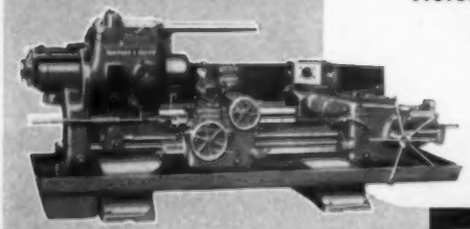
No hesitation, no waiting when changing the spindle speed on the Bardons & Oliver No. 22 Saddle Type Turret Lathe. The centrifugal hydraulic governor instantly slows down the gears to the right speed for quiet shifting.

The single lever effortlessly controls the speed changing, starting, stopping, reversing and braking of the spindle.

Additional outstanding and exclusively Bardons & Oliver features of this turret lathe include—

Hydraulic indexing of the hexagon turret
Preselective hydraulic feed changes in the aprons
Six-way rapid traverse for the cross slide, carriage and saddle
Full length carrier for the twelve highly accurate turret stops
Powerful hydraulic collet chuck and bar feed
Automatic indexing, locking and clamping of the square turret

Investigate the labor and cost saving possibilities. Write us for full information.



Builders of a complete line of Ram and Saddle Type Turret Lathes, also Hydralectric, Hydraulic and Hand Operated Cutting-Off Machines

BARDONS & OLIVER, INC.
1133 WEST 9TH STREET • CLEVELAND 13, OHIO

Production gaging with External Comparator No. 951 and Amplifier No. 950.

NEW! *Electronic*

● **EXTERNAL** ● **INTERNAL**

Precision gaging on a mass-production scale is now both practical and economical for any plant or laboratory! The new Brown & Sharpe Electronic Measuring Equipment applies electronic super-sensitivity to measurement, and electronically amplifies the results for instant, accurate reading on a large calibrated dial. It enables accurate gaging to .00001", as fast as test-pieces can be handled.

An outstanding advantage of this new Electronic Measuring Equipment is the separate amplifier unit, which isolates heat-producing elements and prevents temperature drift in gaging units. Another unique feature is the true linear response of the gaging units, which permits accurate setting for the entire scale with only one gage block or master. These are only two of *many* advantages.

Get the full story of this versatile new Electronic Measuring Equipment. Write for details. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

We urge buying through the Distributor

Speedy internal gaging with Internal Comparator Attachment No. 952, Amplifier No. 950 and Signal Light Attachment No. 958 (optional).

Gage Head Cartridge No. 953 is shown mounted in special fixture for linear gaging.

BROWN & SHARPE

The extreme versatility and unusual adaptability of Whitney Chains to meet both usual and special requirements make them the experienced designer's choice for all types of applications from power transmission to material conveying.

Whitney Chains . . . *the all-steel drives* . . . deliver *full* power without slippage. Their positive grip transmits constant, uniform speed. Tough and rugged, they give long-lived service with minimum maintenance.

Regardless of the application, you will find that it pays to *standardize* on Whitney Chains. And to complete your drives, the best combination is Whitney Chain plus Whitney Cut Tooth Sprockets. Write for complete information.

The Whitney Chain & Mfg. Co.
HARTFORD 2, CONNECTICUT

● If you are one of the many manufacturers concerned about making cost reductions to meet competitive situations—you will be interested in the new series King Vertical Boring and Turning Machine.

Here is a substantially heavier machine with all the power—speed—rigidity required for the successful and economical use of carbide tools.

You will also be interested in the convenience of control—all operating controls are at the front within easy reach of the operator in his normal working position.

In addition they have a wide range of speeds —high or low to meet every operating need within sound engineering standards.

Experience has proved the machine capable of the heaviest cuts at highest speeds modern cutting tools will stand. You can rely on the new series King for higher production—precision work—lower costs.

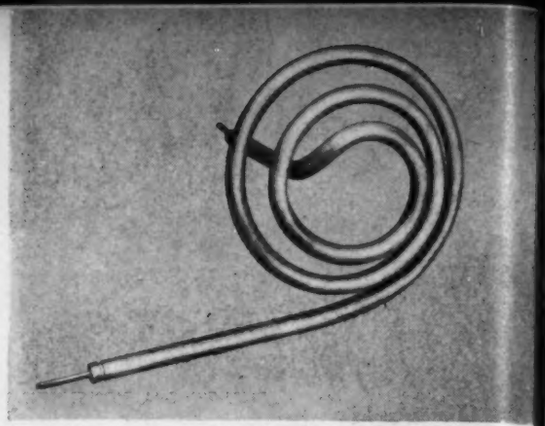
Available in ten sizes 30", 36", 42", 52", 62", 72", 84", 100", 120" and 144".

THE KING MACHINE TOOL COMPANY

CINCINNATI 29, OHIO

Builders of Vertical Boring and Turning Machines Exclusively

How Bliss Hydraulic and Mechanical Presses Team Up to Triple Production at Hotpoint, Inc.



The Calrod unit is made from Inconel, a nickel alloy. Stepped design presented a difficult die problem.

In keeping with their policy of employing the most modern methods of manufacture, the tool engineers of Hotpoint, Inc., makers of high-quality electric ranges, selected three special Bliss 500-ton single-action Hydraulic Presses and two Bliss straight-side Mechanical Presses to perform all the press operations required in the production of the new Calrod units for these ranges. Here's how:

Six-station Bliss dial feed on each hydraulic press allows multiple operations—loading, pressing and unloading—at one time. The press need never be idle. Operation is by electric push-button.

Two operations are performed simultaneously at a single stroke—terminal forming and flattening; hydraulic press cycle completed in 10 seconds.

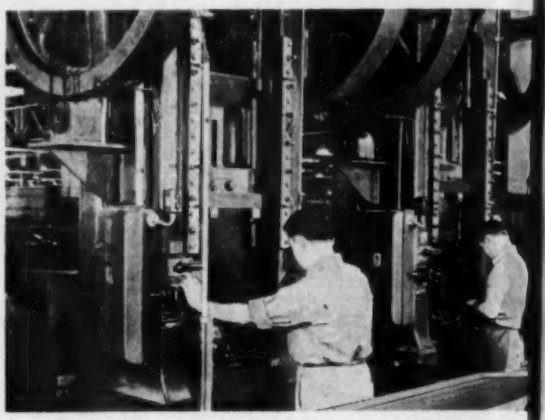
Hydraulic press output is 350 pieces per hour from each unit.

Mechanical presses do final terminal forming—200 pieces per hour on each Bliss 95-ton Straight Side Press.

Added together, this combination of Bliss hydraulic and mechanical presses has tripled Hotpoint's production over previous equipment.

Here, again, is a case example of Bliss press performance—both hydraulic and mechanical—plus Bliss' combined experience in the manufacture and application of both types—stamping added "dividends" on another busy production line.

Bliss sales engineers are production counselors, too. Put your pressed-metal problem before them.



Two standard 95-ton straight side presses of Bliss design perform final terminal forming operation.

E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical and Hydraulic Presses, Rolling Mills, Can and Container Machinery

WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Michigan; Englewood, N. J.; Derby, England; St. Ouen sur Seine, France • SALES OFFICES: Detroit; New York; Cleveland, Dayton, Toledo, Ohio; Hastings, Michigan; Chicago; Philadelphia, Pittsburgh, Pa.; Rochester; New Haven; Boston; Windsor, Ont.

Slide of press cannot descend if the Calrod unit is not placed properly in the die. Quick advance and quick return features are a decided improvement over equipment formerly used.

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY

STAY AHEAD WITH *Bliss*

PRATT & WHITNEY 4D DIE SINKER

WINS WARM WELCOME AT MACHINE TOOL SHOW

Thousands of die makers stopped, looked and applauded as they saw this versatile new machine performing its wonders at the great Chicago Show.

Another important FIRST

Hailed at the Chicago Show as a long-needed advance, the new P&W 4D Die Sinker fills the gap between conventional hand-operated machines and full-automatic reproducing equipment.

All machine motions are power operated, with infinitely variable speeds and feeds, *but* with *all* motions guided effortlessly by the new P&W "Directron" hand control. This device controls continuous compound movements in any direction in either a horizontal or vertical plane. Thus layout lines on a die surface can be followed more quickly and exactly than ever before.

Reproduction of certain impressions can be made from cross-section templates. This is done automatically with extreme accuracy through a tracer-control electric follower. In other cases, both electric follower and manual "Directron" control can be used simultaneously to duplicate die cavities from models.

Write today for complete details on this amazingly versatile new machine that opens up untold possibilities for making original forging dies, molds, etc. on new high levels of accuracy, speed and economy.

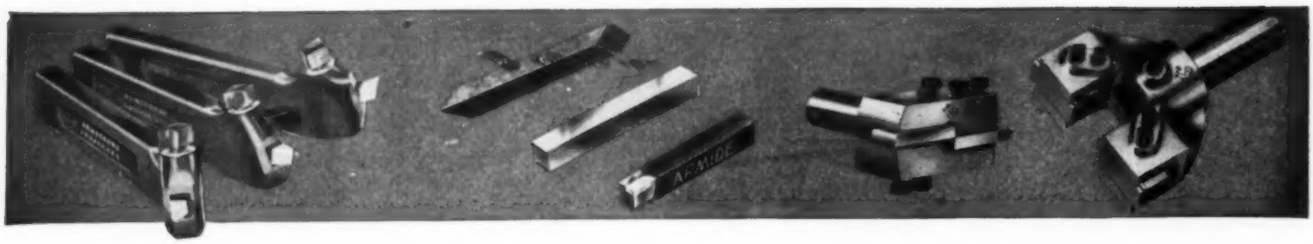
PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT

ARMSTRONG

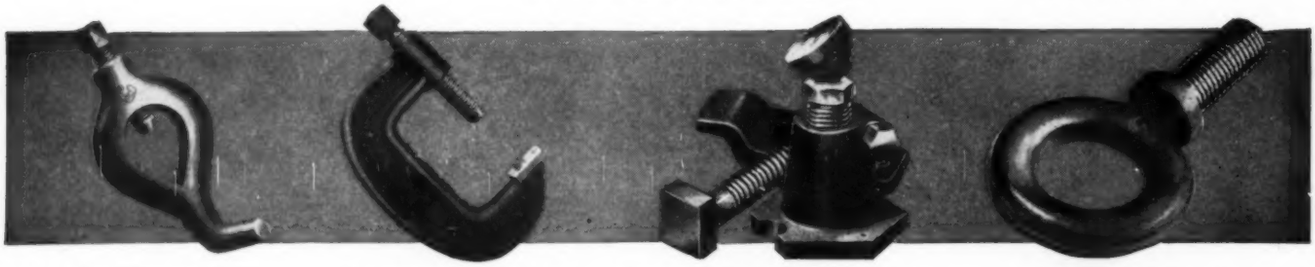
Quality TOOLS



ARMSTRONG TOOL HOLDERS
Permanent, multi-purpose tools, for every operation on Lathes, Planers, Slotters and Shapers.

ARMSTRONG HIGH SPEED
Ready-to-grind Bits...Ground Cutters.
ARMALOY Cast Alloy CUTTER-BITS
ARMIDE Carbide-Tipped CUTTERS
6 cutter shapes, 12 sizes—2 grades.

ARMSTRONG Turret Lathe and Screw Machine TOOL HOLDERS
Drill Holders, Cutter Holders, Finishing and Knurling Tools for standard operations.

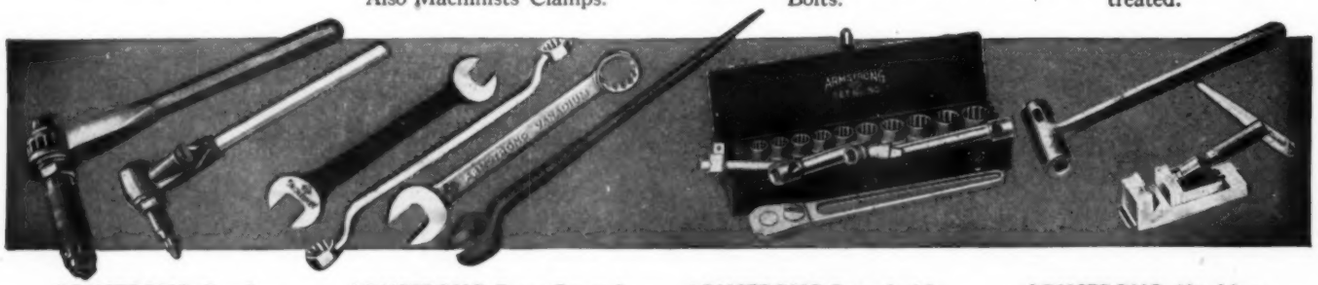


ARMSTRONG Drop Forged DOGS
Lathe Dogs, Milling Machine Dogs, and Clamp Dogs. 12 types, all sizes.

ARMSTRONG Drop Forged "C" CLAMPS
Heavy Duty, Medium Service, Deep Throat, and Tool Makers' types in all sizes. Also Machinists' Clamps.

ARMSTRONG Setting Up Tools
A complete line of Drop Forged Strap Clamps, Planer and Bracing Jacks and T-slot Bolts.

ARMSTRONG Drop Forged Eye Bolts
Plain or shoulder pattern. Blank or Threaded. 14 sizes, Drop Forged and heat treated.



ARMSTRONG Ratchet Drills
All steel wearing parts hardened. Packer, Railroad, Standard, and Short types, both plain and reversible.

ARMSTRONG Drop Forged Wrenches
Both Carbon and Alloy Steel. Over 100 types in all sizes. Improved designs, steels, and heat treating ... stronger.

ARMSTRONG Detachable Socket Wrenches
All sizes and types with driving handles, extensions, and drop forged ratchets. Sold singly or in cased sets.

ARMSTRONG Machine Shop Specialties
Drill Drifts, Tool Posts, Drill Holders, Cutter Grinding Holders, and Tool Makers' Vices.

ARMSTRONG BROS.

Better Pipe Tools. A complete line, each a better tool with hardened, alloy or drop forged parts wherever they will add to strength or tool life.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
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Eastern Whse. and Sales: 199 Lafayette St., New York 12, N. Y.
Pacific Coast Whse. and Sales Offices: 1275 Mission St., San Francisco 3, Calif.

G-E Announces

Two new instruments for saving production time and materials

Here are two new G-E quality-control instruments. Like all G-E testing and measuring equipments, they have been proved in our laboratories and on our production lines.

Good quality control means a saving in hours and dollars to you. Cutting down such waste as avoidable trimmings or excessive rejects can mean big savings to you over a year's period. For help on such individual quality-control problems, state your request in detail. Our engineers can pick from hundreds of equipments to help you with quality control. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

HAND TACHOMETER SIMPLIFIES SPEED MEASUREMENT

The new hand tachometer gives you quick accurate speed indication at low cost. You can adjust the speed of such equipments as motors, cutting lathes, and other machinery to obtain the best operating conditions. Covering an unusually wide range, it weighs only seven pounds. Machinery users and manufacturers both find this new tachometer useful. Write for Bulletin GEA-4895.

METALS COMPARATOR SEPARATES METALS QUICKLY

The new metals comparator sorts metals on basis of chemical composition and heat treatment. Useful for both magnetic and non-magnetic metals. It's portable, economical with an easy-to-read scale. Saves money in metals stockroom by identifying mixed metals. Reduces cutting tool losses by separating machinable from non-machinable metals. Permits rapid inspection—1200 to 1500 parts per hour. Write for Bulletin GEA-4894.

This new Specialized Measuring and Testing Equipment Catalog contains 44 pages of the latest developments in measuring and testing equipment, giving application, description, specifications, photographs, prices and how to order. Here, in easy-to-use form, is assembled information on approximately 100 equipments. If you can use a catalog of this type, fill out the coupon completely and send it today.

NEW FREE CATALOG for REFERENCE and ORDERING

Apparatus Department
General Electric Co., Section 800-38
Schenectady 5, N. Y.

Please send me the new SPECIALIZED MEASURING AND TESTING EQUIPMENT CAT., GEA-639.

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GENERAL ELECTRIC

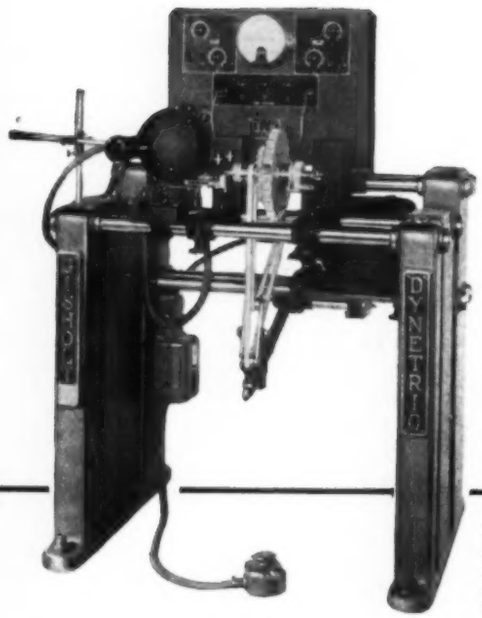
BALANCING 125 ARMATURES PER HOUR

on a Gisholt DYNETRIC Balancing Machine†*

Here's a production set-up for balancing small motor armatures for vacuum sweepers. One operator locates and measures unbalance with a Gisholt Type S Balancer and passes parts to another operator who applies the indicated correction. Parts are then returned to the Gisholt Balancer for inspection.

So efficient is this set-up that 1000 armatures are tested for unbalance, corrected and inspected in an eight-hour day—a rate of better than two a minute. Production was so increased over previous methods that the machine paid for itself in a few months.

The remarkable speed and accuracy of Gisholt DYNETRIC Balancers make it possible for you to cut costs to rock bottom. There are sizes and types to handle all rotating parts from a fraction of an ounce to many tons. Write for literature.



GISHOLT MACHINE COMPANY
Madison 3, Wisconsin

**Trade-mark Reg. U. S. Pat. Office by Westinghouse Electric Corporation*

†Developed jointly with Westinghouse Electric Corporation

THE GISHOLT ROUND TABLE

represents the collective experience of specialists in the machining, surface-finishing, and balancing of round and partly round parts. Your problems are welcomed here.

***Gisholt DYNETRIC Type S Balancers** are designed for balancing parts within a weight range of a fraction of an ounce up to 200 pounds. Complete information on request.*

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Direct VEEDER-READINGS

Save Costly Hours and Errors on all types of Products and Production Machines

NO DIALS TO READ: No "pointer-to-dial" reading to invite errors.

NO "INTERPRETER" NEEDED: Veeder-Readings are *direct* . . . nothing to translate or decode. And the bold, black-and-white figures are *easy* to read.

NO TIME LAG: Veeder-Readings are *up-to-the-minute* . . . give you the whole story on production *as of now.*

NO TIME LIKE THE PRESENT: *Now's* the time to find out how Veeder-Root *Count*rol can count to *your* advantage, in your plant or in your product . . . *or both.* Write.

VEEDER-ROOT INC.

HARTFORD 2, CONNECTICUT

In Canada: Veeder-Root of Canada, Ltd., 955 St. James St., Montreal 3.
In England: Veeder-Root Ltd., Dickinson Works, 20 Purley Way, Croydon, Surrey.

KUX

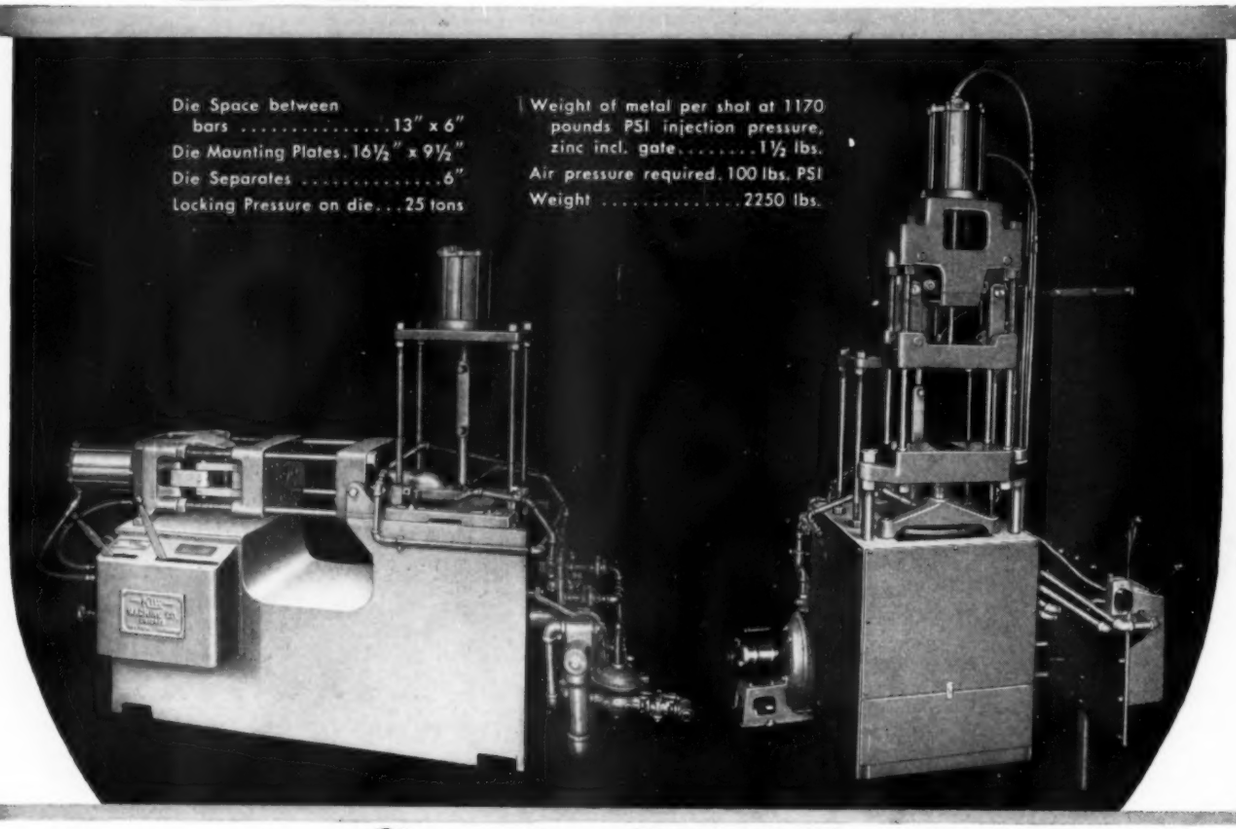
The Mighty MIDGET of Die Casting Machines

THE NEW KUX MODEL K

is the safest, most highly productive small die casting machine on the market! Available in horizontal or vertical center shot models, die castings weighing up to 1½ pounds in zinc are produced under high injection pressures, insuring quality, dense castings with minimum porosity. ***Compare these features:*** Center shot operation with floating nozzle always in seated contact with the die and one-piece gooseneck. Speed and power obtained by use of an air compressor to operate opening and closing of die, and metal injection plunger. Double safety lock, mechanical-electrical, prevents metal shot while die is in open position. Double toggle mechanism locking in two directions absorbs all locking pressures, operates on all four corners of die plate. Built-in ejector plate for positive ejection. Self-contained gas or oil firing unit.

Die Space between bars ..... 13" x 6"
Die Mounting Plates. 16½" x 9½"
Die Separates ..... 6"
Locking Pressure on die... 25 tons

Weight of metal per shot at 1170 pounds PSI injection pressure, zinc incl. gate..... 1½ lbs.
Air pressure required. 100 lbs. PSI
Weight ..... 2250 lbs.



Write now for an illustrated folder

KUX MACHINE COMPANY
3922 W. HARRISON STREET • CHICAGO 24, ILLINOIS

PRODUCTION

SHARPENING

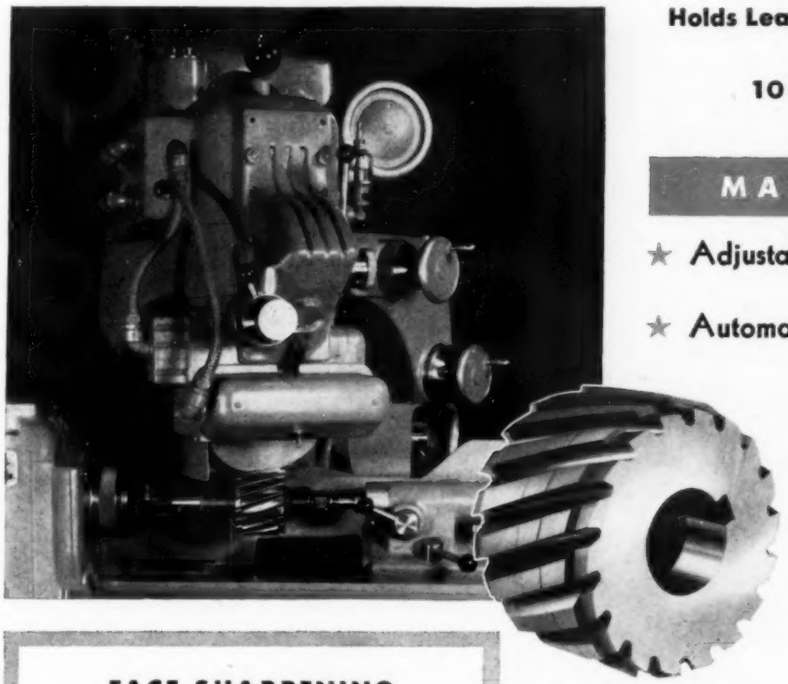
PRECISION

SHARPENING

IT'S ALL THE SAME ON THE

No. 6-5

New Barber-Colman No. 6-5 Hob Sharpening Machine Demonstrates Consistent Accuracy on Volume Sharpening of Spiral Form-Relieved Milling Cutters



Holds Lead On 18° Helical Gashes Within .001", Rake Angle Within .0005".

10-13 Micro-Inch Finish Obtained.

MACHINE FEATURES

- ★ Adjustable Hydraulic Table Speed and Stroke
- ★ Automatic Feed and Index Counting
- ★ Wet or Dry Grinding
- ★ Precision Indexing
- ★ 3 Spindle Speeds

These are just a few of the many features on this machine which make it possible to produce tool room quality sharpening on a volume basis. For complete details write for a copy of bulletin 3213.

FACE SHARPENING

32 Irregular Shaped Formed Cutters with 18° Helical Gashes and 5° Positive Rake
Cutters — 4" diameter x 2.702" long x 1-1/2" hole, 18T.
Depth of Grind — 5/16".
Spindle Speed — 4300 RPM
Stock Removed — .035"
Coolant — Oil
Accuracy — Adjacent Spacing — .0003" - .0005"
Accumulated Spacing — .0016"
Lead of Gash — .001"
Rake Error — .0005"

EASIER, MORE ACCURATE BARBER COLMAN **HOB SHARPENING**

Barber-Colman Company

GENERAL OFFICES AND PLANT 111 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.

SUPER ACCURACY

in Simple Form for your Fine Tolerances

STANDARD

Micronar

Dial Indicator

A Definite Advance in PRECISION

Fine Adjustment Screw Facilitates Setting

Sapphire Tipped Contact Point Guards Against Wear

Exceptionally Consistent REPEATABILITY

Improved design gives uniformly better performance than has yet been possible with high amplification indicators. Amplifies measurements *more than 1500 times*, with outstanding consistency.

HIGH ACCURACY

Equivalent in accuracy to that of much more costly instruments. Ideal for checking gages, inspection, high precision production, or for universal comparator applications.

NO FLUTTER OF HAND

The light-weight hand is instantly responsive and snaps to reading position positively, without fluttering.

SHOCKPROOF CONSTRUCTION

Protects vital parts from damage in case of sudden impact on contact point.

Side view showing standard AGD Lug Type Back; interchangeable with conventional type indicators.

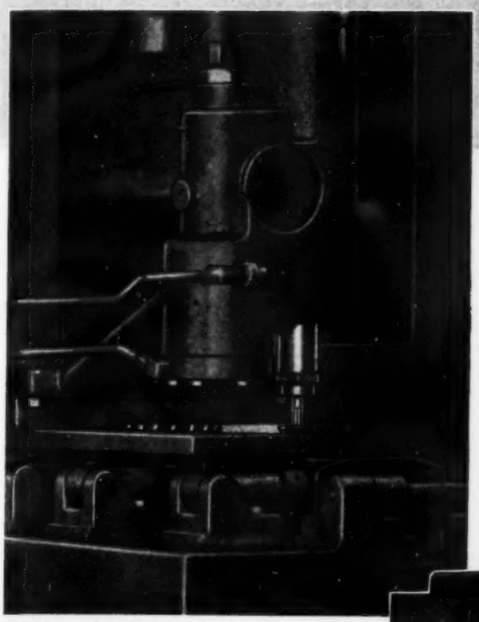
ENGLISH MODEL No. 47 — Graduated .00002" Range .0018"

METRIC MODEL No. 86 — Graduated .001 m/m Range .04 m/m

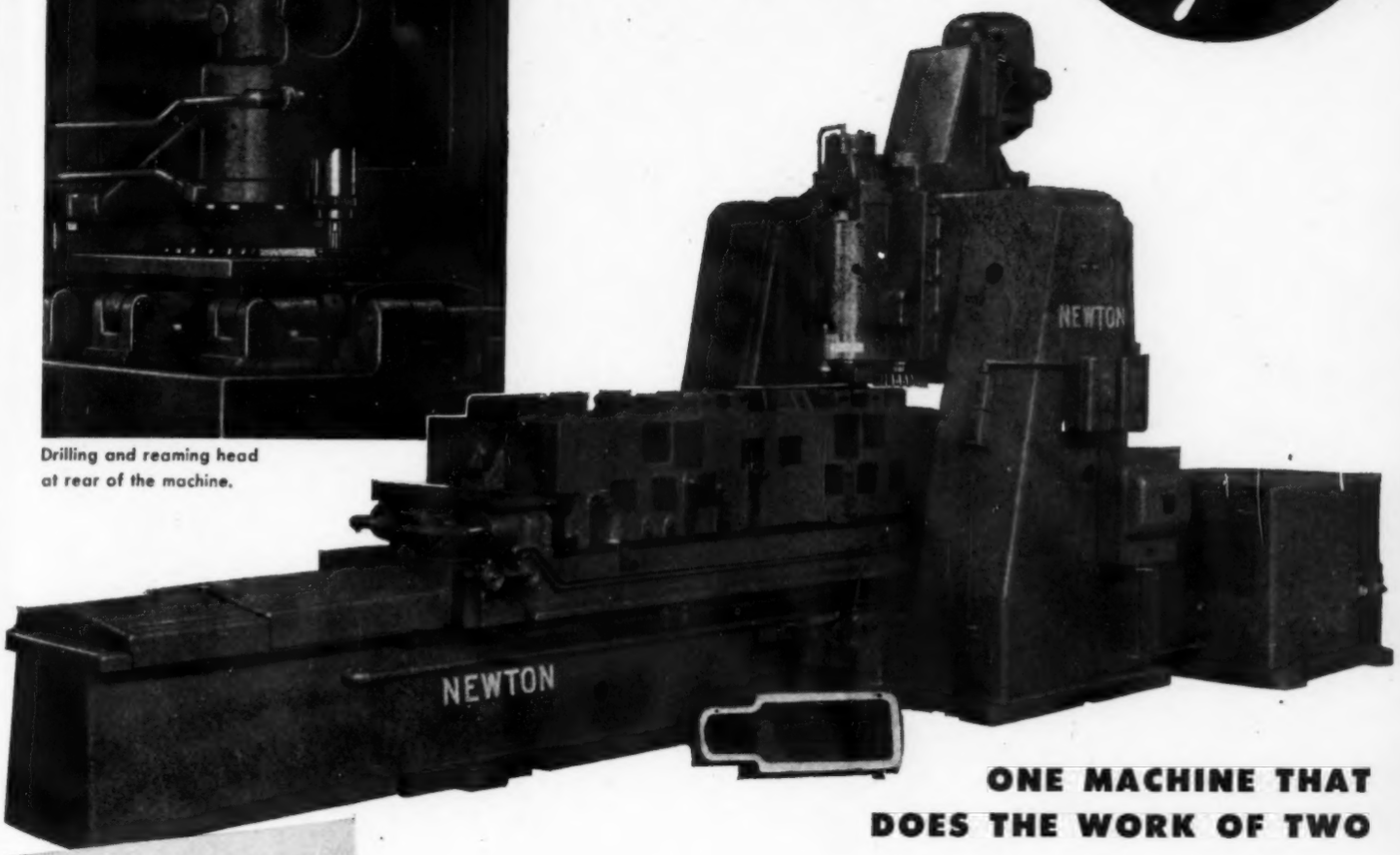
STANDARD GAGE CO., Inc., *Poughkeepsie, N.Y.*

NEWTON COMBINATION MILLING, DRILLING and SHAVING MACHINE

NEW



Drilling and reaming head at rear of the machine.



ONE MACHINE THAT DOES THE WORK OF TWO

PERFORMS FOUR COMPLETE OPERATIONS AT ONE PASS OF THE TABLE. Rough mills on forward stroke at milling speed . . . stops . . . drills and reams locating holes . . . then finish shaves on return at rapid traverse speed.

SAVES MILLING TIME. Rough mills and finish shaves in the time ordinarily required for rough milling alone.

SAVES HANDLING TIME. All operations are performed at a single setting of the work piece. Unnecessary to remove to another machine for drilling and reaming.

COMPLETE INFORMATION WILL BE FURNISHED UPON REQUEST

Among Heavy Machine Tools built by Consolidated are . . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
BORING, DRILLING AND MILLING MACHINES
DRILL AND TOOL GRINDERS
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER SPECIAL MACHINES

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

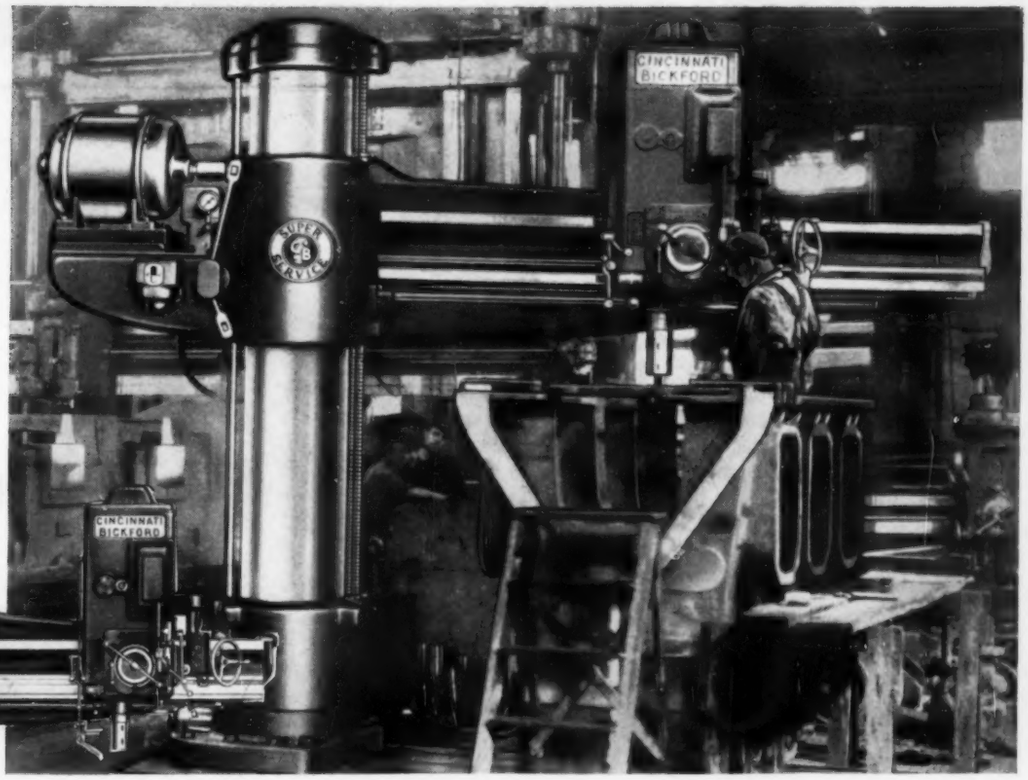
CONSOLIDATED MACHINE TOOLS

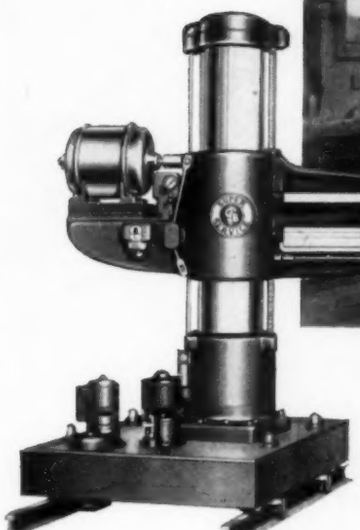
CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

A COMPLETE LINE
of fine Machinists' Tools

BROWN & SHARPE TOOLS





New Savings
IN PRODUCTION DOLLARS

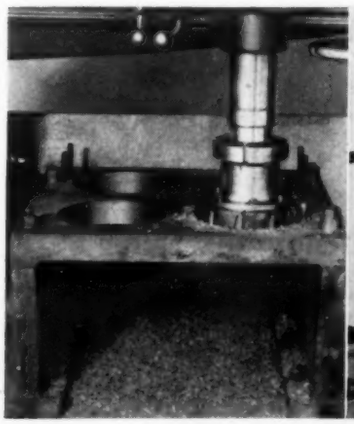
Track mounted—with equalized power clamping to the heavy rails—controlled by push buttons on head.

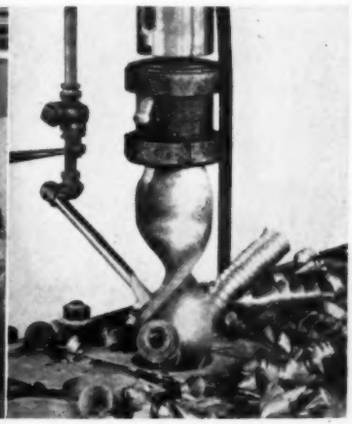
684 drilling operations on a Diesel Center Frame now completed in 17 hours—a 7-hour saving effected by this Cincinnati Bickford Super Service Radial.

"Easy Reach" levers—low on the head—control every operation from column clamping, speeds and feeds, to raising or lowering the arm.

These low controls save the operator steps, give him a clear view of the work, and increase his production.

Send for new Bulletin R-29 showing latest design features.





- Unusually long spindle sleeve bearing permits boring without pilot bar.
- 4" drill in steel at 78 r.p.m.—.017" feet per revolution—it takes power.

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO.

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

Radials 7½" dia. col., 2½' arm, to 26" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers, Portable Horizontals, Spacing Table Machines.

THE CINCINNATI BICKFORD TOOL CO. **Cincinnati 9, Ohio U.S.A.**

Contour Sawing

Sweeping economies in die making over old methods

Shape-cutting "castings" and "forgings" from ordinary stock materials

Tools of all kinds like these micrometer parts are cut fast, accurately

Patterns and templates are cut with speed. Edges are smooth — no burr

"Stampings" made by stack-sawing. There's no cost of punches and dies

Jigs and fixtures, sawed and welded, eliminate machine time

Contour sawing is ideal for making countless production parts

Pipe, tubing, structural iron, etc., is sawed at any curve and angle

19 Models

Contour Sawing saves industry thousands of man-hours every day. It differs from other machine-tool processes in that it does not waste time "whittling" stock to shape but *slices* off unneeded parts – even hard alloys and tungsten carbide. Makes internal or external, curved or straight cuts at any angle. Operators trained in few days – do not need years of machinists' experience. With many special blades and infinitely variable speeds, *Contour Sawing* cuts anything and makes amazing production economies in all industries. Ask about the special DoAll customer research service, free movie for industrial groups, schools, etc.

SKIP TOOTH
FRICTION SAW
CLAW
BUTTRESS
PRECISION
Blades for Every Purpose
Iron . . Steel . . Copper . . Brass . . Alumin
Forgings . . . Dies . . . Tools . . . Machine par
Castings . . Stainless steel . . Tungsten carbid
Heat-treated steel . . Alloys . . Wood . . Pl
Plastics . . Laminates . . Hard-pressed boar
Cloth . . Ceramics . . Glass . .

The DoALL Company

Reg. U. S. Pat.

REPRESENTATIVES IN 56 COUNTRIES

DoALL STORES IN KEY CITIES

Des Plaines, Illinois

American Machinist's Spot NEWS OF METALWORKING

Steel mills are expected to show more reluctance than ever to ship to all basing points as a result of absorbing 10% more freight charges from mills to basing points. They are likely to concentrate more than ever on local markets.

Further use of aluminum castings instead of gray iron castings in all its high-production programs is being studied by one of the large metalworking companies. For one product, it is substituting die castings for gray iron. It is contemplating employment of 30,000 die castings per week, in place of iron castings, in another product.

Lowdown on fuel oil: supply will not catch up with demand for two years, according to high authorities in oil industry. Consumption is outstripping ability of industry to construct new facilities.

Surplus tractors and earth-moving equipment in Germany, not yet declared surplus by War Department, will be furnished European nations under Marshall Plan before any shipments are made of new units from U. S. factories. Number of surplus units is said to be sizable.

Export-Import Bank is reported to have approved private loans to a number of Italian manufacturers and to several companies in Austria. About 80% of the funds will go for materials and 20% for U. S. production equipment, including machine tools. Ball bearing plants are to be built in Italy, Austria, Czechoslovakia and Holland, the latter to be privately financed.

Only two manufacturers out of 200 represented at a recent midwestern meeting had sent any communication at all to employees about the Taft-Hartley Law. One company is mailing 10 bulletins to its men, each bulletin describing a simple phase of the new legislation.

Australia will find dollars to pay for imports of vital capital equipment, a high Melbourne source reports. Imports of metalworking machines into Australia from all sources recently reached $1 million a month. A year ago they were running $250,000 a month.

Tractor engines with 2.5 times the horsepower of today's units will be available within a few years, say manufacturers.

Steel castings are being replaced by weldments here and there as result of scarcity of high-quality castings and of high prices, report some manufacturers. Gray iron castings, by contrast, are holding their own.

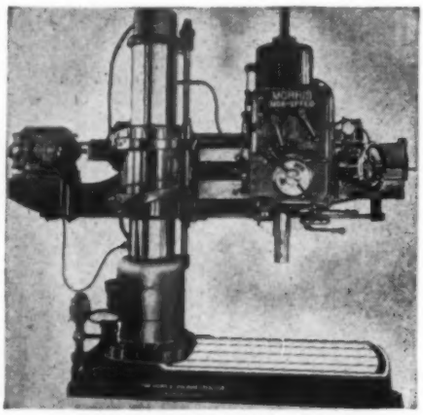
Gas turbine engines as small as 100 hp. are expected within 10 years, predict prominent manufacturers. Lighter-weight diesels with higher speeds also are on the way.

British machine tool industry is much upset because new "level-of-industry" plan for U. S. and British zones in Germany greatly increases allowable production of German machine tools and permits their export. British still stick to belief German machine tool industry should be dismantled as a potential war menace.

(Further news on pages 141-152)

For greater production and lower costs

MORRIS MOR-SPEED 3-Way Horizontal Machine



MORRIS MOR-SPEED RADIAL

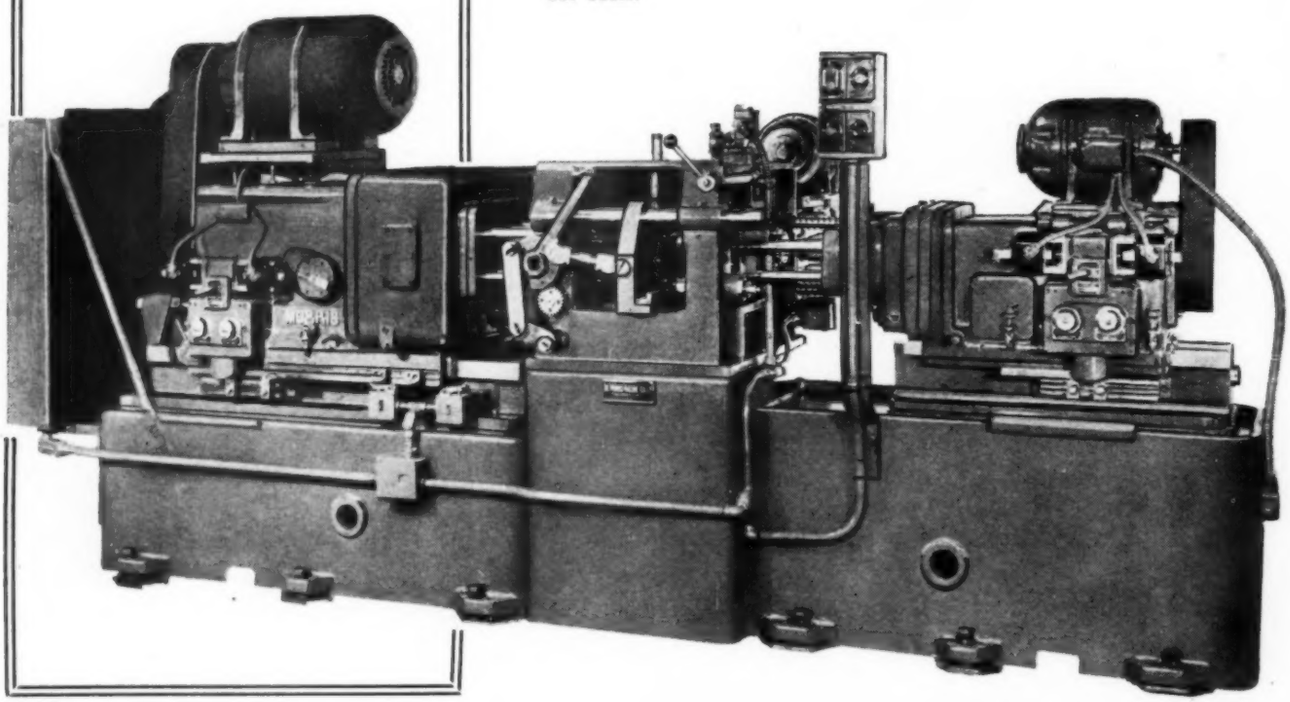
In today's competitive market high production and low costs are essential to profitable output. Many prominent manufacturers have solved difficult production problems with Morris Mor-Speed Drilling Machines.

For example, the machine shown is a 3-way horizontal type with a 22-spindle left-hand unit, a 5-spindle right-hand unit—and a single spindle unit at the rear. All heads are powered with individual motors. Operator merely loads and unloads a hand clamped type of fixture as all machine functions are automatic.

This machine drills all the holes in the valve chamber cover of an automobile engine at one setting—a piece is completed at every cycle.

The machine is typical of hundreds of Mor-Speed drilling machines developed by Morris for specific job requirements.

If you have work requiring drilling—reaming—tapping, etc., on a mass production basis, consult Morris. They have the experience—the engineering "know-how" and facilities to help you increase production and cut costs.



Builders of MOR-SPEED Lines

The MORRIS Machine Tool Co.

CINCINNATI 3, OHIO

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

The Weakest Link

Handling work into and out of machine tools is worthy of more attention than it thus far has received.

Up to now the new machines themselves have been of overshadowing interest. But the recent Machine Tool Show pointed up an important fact.

If users are to secure the greatest possible production from new machines, they must equip them with feeding and ejecting mechanisms timed to today's rapid machining cycles.

It is not just a matter of getting the most out of a machine. It is not merely the knowledge that slow work-handling retards the efficiency of a new, rugged, high-powered machine tool.

If the devices for handling work do not measure up to the machine itself, the entire factory production is geared to a slower pace than necessary. Output suffers and the lowest manufacturing costs cannot be attained. "A chain only is as strong as its weakest link."

What purpose is there in buying the latest machine tool unless the loading and unloading can match the speed of the machine itself?

The user does not purchase just a machine tool when he places an order. He invests in greater output per man. He knows in advance that he will be able to perform a certain operation in say 23 seconds instead of 2 minutes.

Anticipated savings cannot be realized, however, unless the machine tool is kept working a maximum percentage of the time. Work must be fed into and taken away from it promptly.

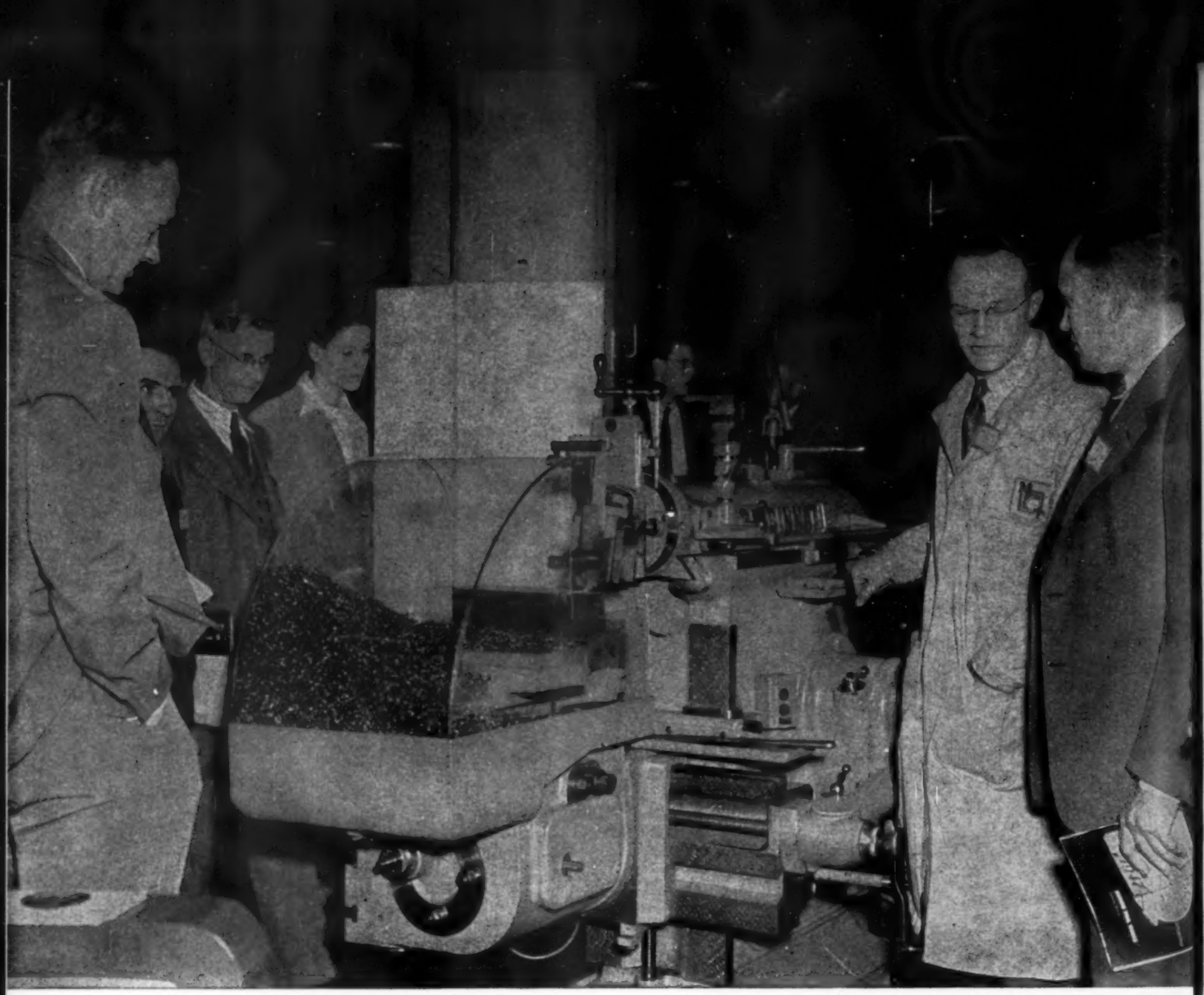
Some machine tool users are fully aware of these simple facts. They act upon them whenever they tool a new job.

Too many users, however, overlook the desirability of giving as much thought to providing efficient and modern work-handling mechanisms as to equipping their shops with the latest machines.

Look to the methods of getting work into and out of your machines. Otherwise you cannot make the maximum savings in cost.

Burnham Finney

EDITOR



*Demonstration at Machine Tool Show, Chicago.

CARBIDES PAY ... with the CINCINNATI TOOL LIFTER ...on CINCINNATI SHAPERS

The rigidity that dampens vibration; the power for the toughest steels; the speed for thrifty carbide performance—all are found in Cincinnati Heavy Duty Shapers.

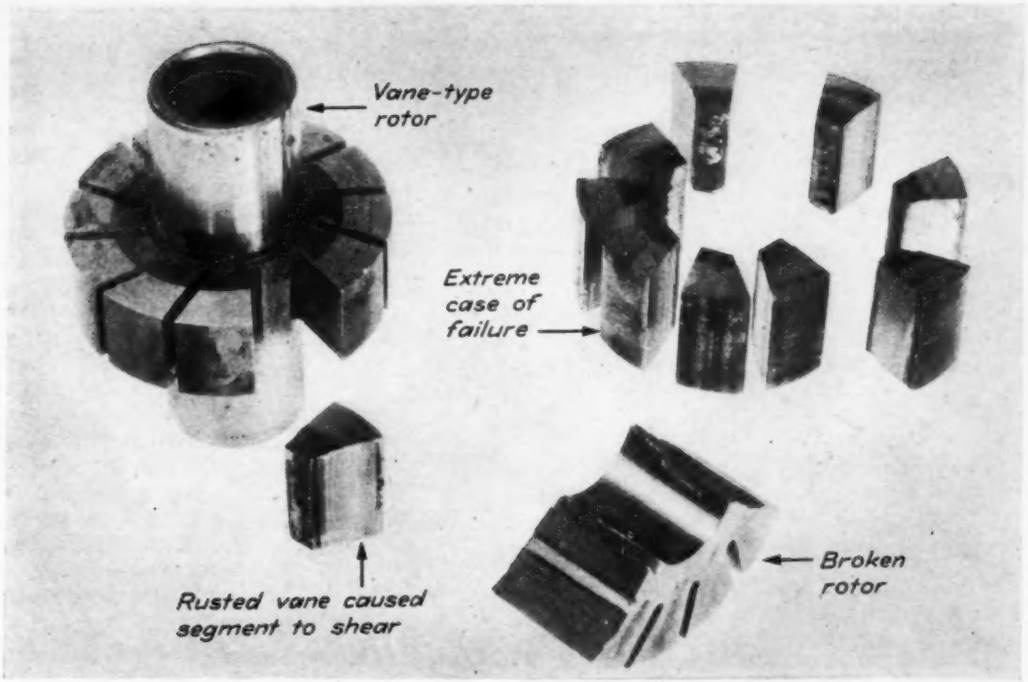
Whether it's alloy steels, chilled castings, chipper blades, or glass molds—carbides on Cincinnati Heavy Duty Shapers are cutting manufacturing costs.

*This Cincinnati Shaper, equipped with a Cincinnati Tool Lifter and carbide tools, operated steadily at 200 strokes a minute at the Machine Tool Show in Chicago. During this ten-day demonstration the shaper was producing a superior finish—quickly and efficiently—on Heppenstall grade B die blocks.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES



***EARLY FAILURE** of rotary-vane pumps will occur, unless proper consideration is given to the service properties of hydraulic oils. Left—Rotor segment sheared from pressure created by rusted vane. Right—Extreme cases of failure*

WHAT TO LOOK FOR IN HYDRAULIC OILS ...I

Hydraulic equipment may fail in a week if all six service properties of hydraulic oils are not properly considered

BY ANTHONY J. ZINO, JR.*
LUBRICATION ENGINEER

SUCCESSFUL design and maintenance of hydraulic equipment are based in large measure upon knowledge of the fluids employed as power-transmitting media. These products—usually petroleum oils—must do more than transmit power. They are also required to act as sealants and lubricants, therefore must possess certain properties.

Ordinary specifications (Table I) for petroleum oils do not suffice. True, these serve to obtain a uniform product, but they do not correctly measure service-performance characteristics of hydraulic oils (Table II).

* *Mr. Zino was formerly with E. F. Houghton & Company, Philadelphia.*

In fact, only two of the six necessary properties are mentioned in the first list.

The purpose of this article is to summarize the importance of the six service properties and to illustrate typical failures when the hydraulic fluid lacks one or more of these essentials. Six succeeding instalments in the series will discuss each property in detail, provide information on tests, depict various hydraulic problems and how to solve them. The case for paying heed to proper selection of hydraulic fluids can be summarized as:

VISCOSITY

Unquestionably, viscosity is the most important property of an oil applied to a hydraulic circuit. Viscosity has direct influence on hydrodynamic losses, frictional and pressure losses, leakage and pump and valve noises within a circuit.

An optimum viscosity exists for

NECESSARY SERVICE PROPERTIES OF HYDRAULIC OILS

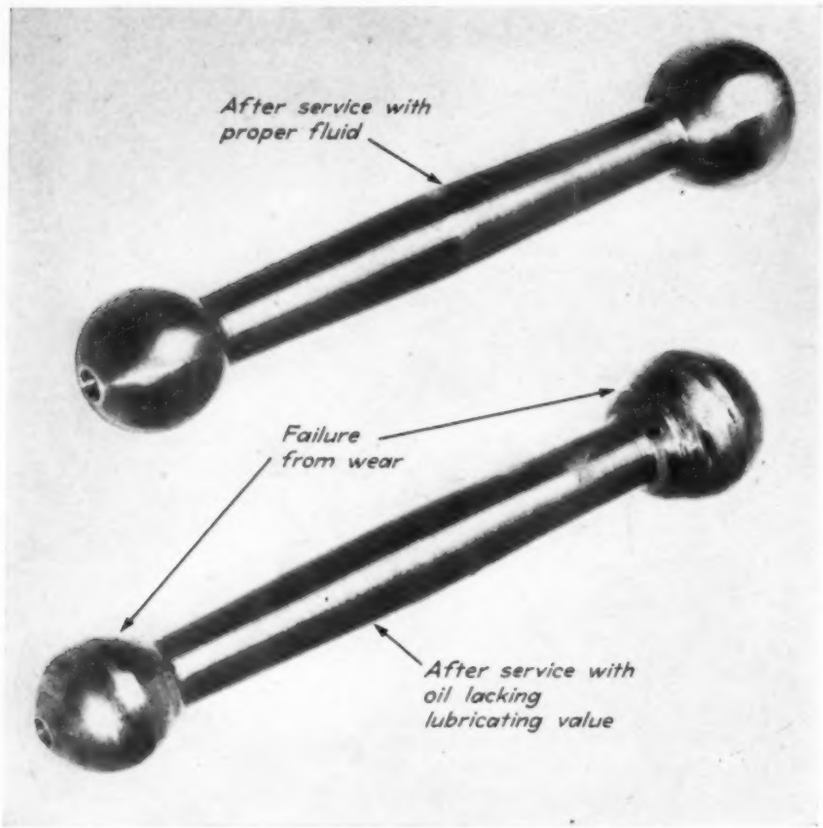
TABLE I
*USUAL SPECIFICATIONS**

1. Gravity, A.P.I.
2. Viscosity, S.U.S.
3. Viscosity index
4. Flash point, F.
5. Fire point, F.
6. Neutralization number
7. Carbon residue
8. Color, A.P.I.
9. Pour point, F.

* *Definitions will be found on page 95.*

TABLE II
SERVICE PROPERTIES

1. Viscosity
2. Viscosity index
3. Demulsibility
4. Oxidation stability
5. Lubricating value
6. Rust and corrosion preventive qualities



***EXCESSIVE WEAR** of a connecting rod (bottom) for axial-piston pump occurred in three months, because the hydraulic oil lacked oiliness under operating pressures of 1500 psi. With correct oil, the connecting rod (top) will operate indefinitely*

any given hydraulic circuit. To obtain maximum overall operating efficiency, the proper viscosity must be determined from field or plant tests. It is fortunate, however, that the viscosity requirements of the most critical component of the circuit—the hydraulic pump—has been previously established by the manufacturer. *But viscosity of the hydraulic fluid specified for the pump is only the starting point for final determination of the proper viscosity for the entire circuit.* For this reason, discretion should be used by the equipment builder in making a definite recommendation. *Only after an extensive field test, in which the equipment is used in its full productive capacity, can the final viscosity requirements of the circuit be known.*

After viscosity requirements of a specific circuit are established, the modified Ostwald Viscosimeter is available for establishing the exact viscosity standards.

Viscosity Index

The relative ability of oils to resist changes in viscosity with temperature is known as the viscosity index. Presumably, the ideal hydraulic fluid is one with the same viscosity at all temperatures and pressures. Unfortunately, no such oils of petroleum base exist.

Viscosity index is important to the designing engineer and the ultimate operator. The designing engineer is basically interested in its effect on hydraulic slip or volumetric efficiency, tolerances, accuracy of operation, and compromises which are necessary for optimum results. On the other hand, the equipment user is interested in its effect on the mechanical operation and efficiency of his machinery. The use of hydraulic fluids with relatively high viscosity indices is essential to optimum operating efficiency.

Fortunately, the relative ability of oils to resist changes in viscosity with temperature can be mathematically computed by means of the Dean-Davis formula. Then it is possible to decide between two fluids and obtain maximum operating efficiency from use of the fluid with the higher viscosity index. However, caution is required because the method does not take into consideration the effect of pressure—an important factor in operation of hydraulic circuits.

Demulsibility

The general design, construction and operation of a hydraulic circuit is conducive to precipitation of moisture within the system and to formation of stable water-in-oil emulsions. Hence, the fluid must have ability to: first, separate rapidly and completely from such contamination; and second, resist emulsification. This physical property of the fluid—demulsibility—is governed by degree of refinement and presence of chemicals (or additives) which are water absorbing in nature. Highly refined and untreated hydraulic oils are basically water resistant in nature and possess excellent demulsibility characteristics when new. They are also noted for ability to maintain this important property during long periods of service.

Inability of hydraulic fluid to maintain demulsibility characteristics in service is usually reflected in destruction of lubricating value and sealant properties. Of equal importance is the effect of the "absorbed" water on both the life-expectancy of the fluid and service life of working surfaces. The ability of the oil to absorb air is also related to the fluid's water absorption and demulsibility characteristics. Further, in studying causes for poor demulsibility, thought should be given to organic chemicals added to fortify some other physical property and to compounds that find their way into the system during service.

Oxidation Stability

Ability of an oil to resist polymerization and thermal decomposition in the presence of air, water, heat and dissimilar metals is referred to as its "oxidation stability." This chemical feature of an oil is not only dependent upon its own inherent weaknesses but also upon the operating environment. Inherent structural or chemical instability of an oil is derived from the crudes from which it is made, their method of refining and subsequent treatment with additives. Operating environment includes destructive influence of temperature, pressure, extrinsic contaminants and reactive metals.

Temperature is unquestionably the most important factor. Optimum operating temperature-viscosity range is normally above 90 F. and below 160 F. Continuous operation at the higher end of this temperature range with oils of poor stability may cause

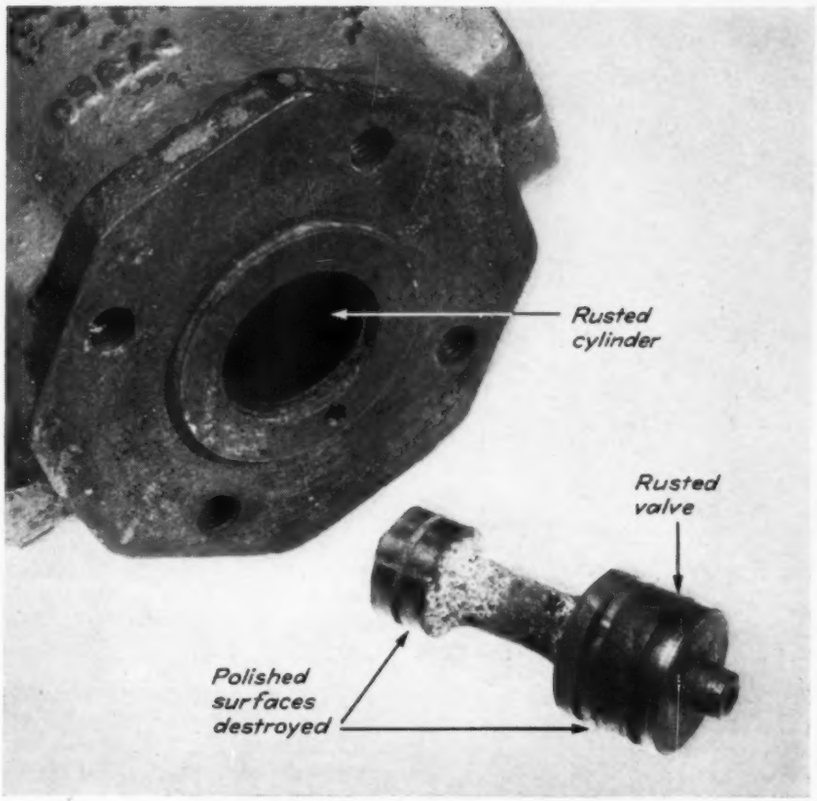
them to polymerize (thicken) and to decompose and precipitate gums, resins and carbon throughout the circuit.

The fluid's viscosity and frictional losses within a circuit increase with an increase in operating pressure. This change is normally reflected in higher fluid temperatures, and affects stability of the fluid.

Presence of extrinsic contaminants is a serious threat to stability of the fluid and wear-life of the operating components of the circuit. Major causes for these contaminants can be traced to faulty machine design; improper material standards and control; or lack of preventive maintenance.

Resistance of a fluid to oxidation is affected by metals in the circuit and temperature of operation. Typical of the more reactive metals are copper and its alloys. Metal is a catalyst in oxidation of oil; the rate of reaction is accelerated by increases in temperature.

Use of oxidation inhibitors will minimize the effect of temperature, reactive metals and oxygen on the life-expectancy of the fluid. Development of excessive heat can be minimized by addition of heat-exchangers to the circuit. Determination and elimination of the source



***WATER IN HYDRAULIC OIL** caused a costly shutdown, because this flow control valve was badly rusted. By choosing an oil with rust-preventive characteristics, finely finished surfaces will not be damaged if water or condensate gets into the circuit*

IMPORTANCE OF USUAL HYDRAULIC-OIL SPECIFICATIONS

GRAVITY, A.P.I.

Specific gravity has no direct influence on lubricating value or quality of hydraulic oil, but is useful in computing the absolute viscosity. The relationship between specific gravity and A.P.I. gravity, as obtained by petroleum hydrometer is:

$$\text{Spec. Grav.}_{60\ F.} = \frac{141.5}{131.5 + \text{A.P.I. deg.}}$$

FLASH AND FIRE POINTS, F.

These specifications are of little importance to the operator of hydraulic equipment. They have no direct influence on lubricationg value or thermal stability in a hydraulic circuit. But it is well to bear in mind that "hot spots" can exist, where temperatures will exceed the oil's flash and fire points.

NEUTRALIZATION NUMBER

The neutralization number is the number of milligrams of potassium hydroxide required to neutralize acids in one gram of oil. In an unused oil, the neutralization number is an indication of the degree of refinement; in a used oil, it is not a definite indication of thermal decomposition or corrosivity.

CARBON RESIDUE

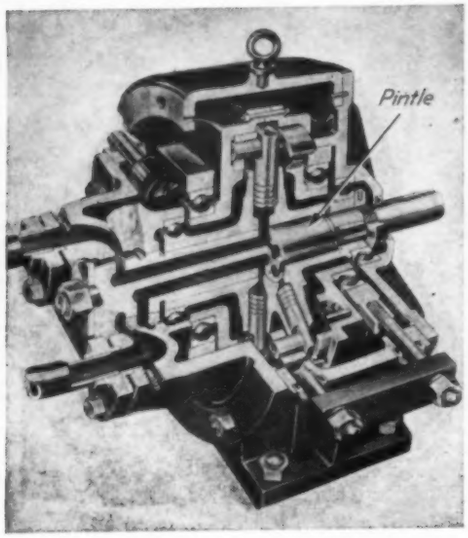
The carbon residue (Conradson) value of an oil, as determined by the A.S.T.M. method D189-46, is the result of partial decomposition of the oil under excessively high temperatures, and is of no direct value in evaluation of a hydraulic oil.

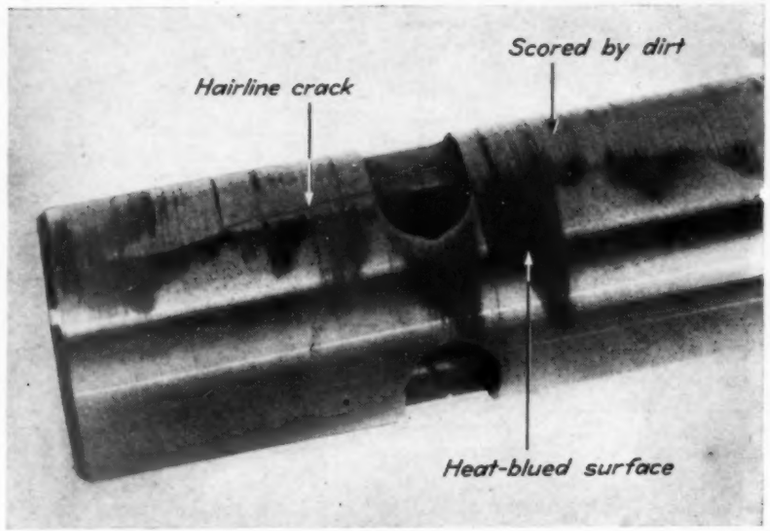
COLOR, A.P.I.

Color of an oil does not indicate quality, but serves as an index of control and uniformity. To the equipment operator, color is useful to observe changes that have taken place in the oil during service.

POUR POINT, F.

As determined by A.S.T.M. method D97-39, the pour point of an oil is of value in ascertaining its suitability for low-temperature operation. Most hydraulic circuits function at temperatures well above the oil's pour point. Some equipment must start up at relatively low temperatures: hence, a knowledge of the oil's pour-point characteristics is of value.





***FINE FINISHES** on hydraulic pumps must be protected by choosing hydraulic oils able to withstand operating temperatures and pressures. The pintle (right) failed in a week because the maintenance oil applied was unsuitable for a pressure of 2500 psi. and a temperature of 140 F.*

from which extrinsic contaminants find their way into the fluid will overcome their destructive influences.

Useful in the study of a fluid's basic chemical instability to oxidation is the A.S.T.M. "Proposed Method of Test for Oxidation Characteristics of Steam Turbine Oils." Since the original proposal of this test, several changes have been suggested in order to adapt it for hydraulic fluid study.

Lubricating Value

The fluid's lubricating value is dependent upon its chemical nature and affinity for metals. Thus, lubricating value of an oil is a function of: first, its oiliness characteristics; second, its extreme pressure or anti-weld properties; and third, the composition and physical nature of the rubbing surfaces.

Oiliness is that chemical feature of an oil which permits it to "wet" the rubbing surfaces and establish a lower coefficient of static and kinetic friction under conditions of boundary friction. Oils relatively deficient in this quality can be improved by chemical processing with oiliness agents.

The extreme pressure or anti-weld properties of an oil refer to its ability or the ability of its chemical films to resist rupture and prevent actual seizure under conditions of boundary friction. As the extreme-pressure properties of highly refined mineral oils are relatively low, it is possible to improve this desirable characteristic through the use of certain organic sulphur, chlorine, or phosphorus compounds in the base oils.

The use of hydraulic fluids containing both oiliness and extreme-pressure additives is beneficial to new and old equipment.

Rust and Corrosion Preventive Qualities

Operating conditions within a hydraulic circuit are conducive to precipitation of moisture and the ultimate formation of rust, as well as oxidation of the oil and possible production of corrosive organic compounds. To be successful a hydraulic fluid must possess ability to protect working surfaces from these two destructive influences. Rust is the resultant product of an oxidation reaction and is reflected in *metal growth*; whereas corrosion is the effect or result of the action of acids on metals and is reflected in *metal loss.*

Highly refined mineral oils are not particularly effective in preventing the rusting of polished steel surfaces. This deficiency can be rectified by suitable and compatible rust inhibitors. The effectiveness of these inhibitors can be easily tested and observed in service.

Corrosion of metallic surfaces within a circuit is apparently due to the action of organic acids in the presence of organic peroxides. Thus it would appear that a definite correlation exists between an oil's oxidation stability and its corrosivity, particularly so since highly refined mineral oils containing oxidation inhibitors, are non-corrosive in service.

Although corrosion is not too serious a problem, a fluid possessing corrosion-preventive qualities is desirable to avoid pitting.

General Conclusions

To assure optimum mechanical results; maximum hydraulic efficiency; freedom from rust, corrosion and sludge deposition; minimum valve and pump wear; and long oil life; a petroleum oil to be successful as a hydraulic fluid must possess all of the essential service properties described. An oil excelling in any one feature or group of features is not always sufficient to warrant satisfactory results. Moreover, it is also evident from a study of this important subject that an oil must be fortified with one or more organic chemicals (additives) in order to insure these results.

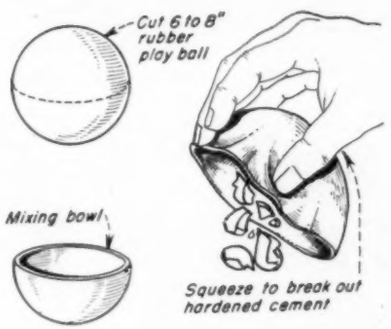
Furthermore, as the application of hydraulic circuits to industrial equipment, as well as to other types of equipment, is rapidly expanding, more fundamental study and research are necessary for the quantitative evaluation of each service property. Present laboratory tests and equipment, with few exceptions, are either inadequate or require further development in order that their results can be made useful. Cooperative research is essential in such endeavors and should be undertaken by various groups.

Part II—Viscosity, including valuable charts, will appear in an early number.

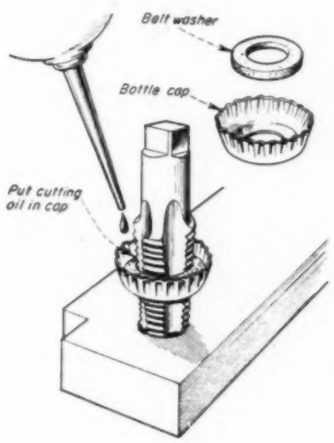
Short Cuts FOR THE SMALL SHOP

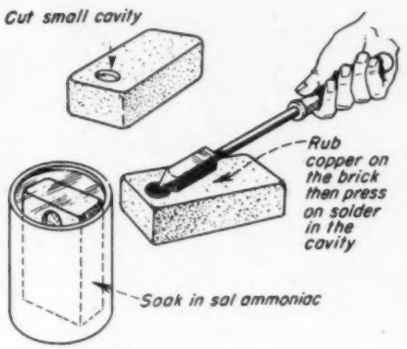
BY A. H. WAYCHOFF

CEMENTS and plaster of paris are mixed at various times—often in a container that is too good to be ruined by hardening of the excess. To avoid the trouble of chipping, cut in half a 6- to 8-in. rubber play ball. Now you have two mixing bowls in which the material can be kneaded if necessary. And when the excess hardens, it can be cracked loose easily by squeezing the rubber bowl. Now it is a simple matter to nest the bowls for storage in a convenient place.



HAND TAPS will cut better threads if an "oiler" is applied to the tool. Take a bottle cap, pierce a hole to thread onto the tap and put a snug-fitting felt washer into the cap. Squirt some cutting oil into the cap. Oil will feed into the hole; it will not be necessary to apply the squirt can.

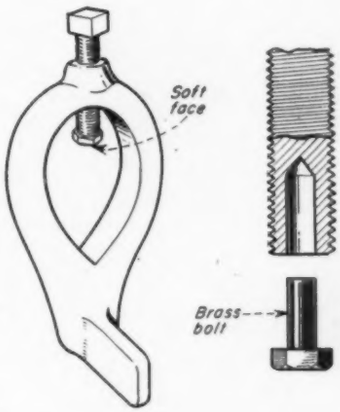




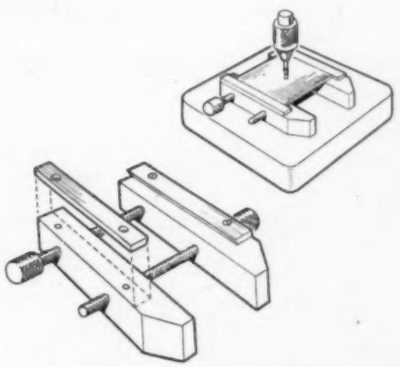
SOLDERING IRONS can be cleaned and tinned much better with this gadget for the bench. Get a soft common brick and chisel a saucer-shaped cavity. Make up a saturated solution of sal ammoniac, put in a jar and soak the brick for 24 hr. Fill the cavity with solder. To use: put the brick on the bench, rub the hot soldering-iron tip on the brick to remove oxides (and pick up a little sal ammoniac in the bargain) then tin in the solder. This saves a lot of time compared to rubbing or brushing the iron.

FOOTBALL players are not the only people who need shoulder pads. Repair men and others about the shop often have to carry heavy shafting, pipe or other objects on the shoulder. A short piece of an old auto tire will prevent soreness.

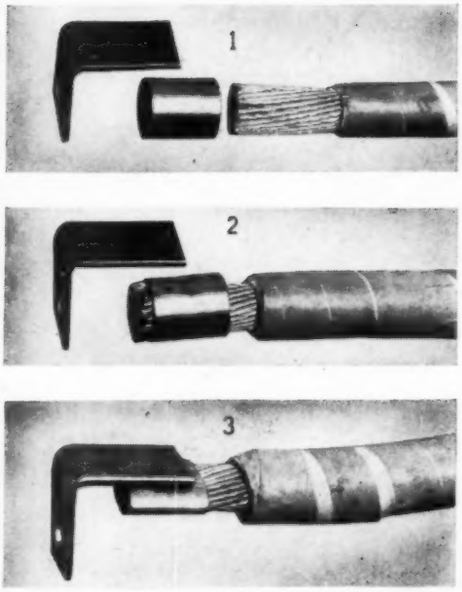
IF A LATHE-DOG SCREW is fitted with a brass foot, it will not mar a finished surface on the work. Merely drill a ¼-in. hole about ½ in. deep in the end of the screw. Cut the shank of a ¼-in. brass bolt to correct length and slip into the drilled hole in the dog screw. The head of the brass bolt will provide ample contact with the work and cannot mar it.



A HAND VISE for thin stock can be made from a pair of cheap clamps. Make a pair of auxiliary jaws from 3/16-in. bar stock, bevel one edge of each piece and fasten to the clamp jaws with machine screws. Adjust the clamp jaws approximately to the width of the stock, position it between the auxiliary jaws and tighten the clamp. This makes a good holder for light drilling operations.



Transformer taps, when brazed to terminals, are cleaned of insulation and assembled between carbons. The operator adds brazing material externally as he controls the current, by a foot switch, from the 20-kva. brazing transformer. A built-in circulating system keeps cables and tongs cool



Terminals may be carbon brazed to multi-strand copper cables by enclosing strands in a ferrule and flattening to increase area contact for application of brazing agent

Carbon Brazes Copper Parts

BY W. SCOTT, METALLURGICAL ENGINEER, SHARON PLANT, WESTINGHOUSE ELECTRIC CORPORATION

Carbon and electricity combine to braze joint connections faster, stronger and with less danger to adjacent insulation

INCANDESCENT CARBON BRAZING is faster than either oxyacetylene-torch or carbon-arc methods. Heating by carbon is particularly fast because of the large contact area on both sides of the joint and is of advantage where joints must be made adjacent to electrical insulation. In many cases, incandescent carbon brazing is readily feasible without charring insulation only ½ in. away.

The term "incandescent carbon brazing" is derived from the method of applying heat. Carbon blocks hold the parts to be brazed in intimate contact during the heating and cooling periods and supply the heat to bring parts to the proper temperature for melting the brazing material. Heat is developed in the carbon because of its resistance to passage of high-amperage, low-voltage current. Upon completing the electrical circuit, carbons are heated rapidly to a bright red or white heat.

This brazing method is ideal for making electrical connections, because the resulting joint is equal to, or better than, those made by other methods, the operator train-

ing period is short and less skill is required than for oxyacetylene brazing.

The main application for incandescant brazing is joining of flat copper parts, such as used for current-carrying members. The ideal joint consists of two copper conductors overlapped so the length of overlap is three times the thickness of the thinner piece.

Most joints can be resolved to a modification of this basic joint. Three times the cross-section is recommended for a factor of safety in both joint strength and conductivity across the joint. The two brazing materials, Phos-Copper and Sil-Fos, are both high-resistance materials and, when used in thin films, the resistance across the joint is slightly more than the resistance of copper.

Carbon Brazing Applications

A common application is brazing cables to flat terminals. Cleaned strands are first placed in a thin-walled tube, or ferrule, that fits snugly around the cable. A partial flattening of the assembly permits good area contact for the carbons to permit rapid heating.

The ferrule serves two purposes: first, to protect the fine wire stranding of the cable from the high heat of the carbons by distributing the heat more uniformly, and second, to hold the strands in close contact to furnish capillary attraction for the brazing material to be drawn into the joint.

The simplest and most available tool for holding parts is a pair of ordinary pliers, but these are made of metal, are damaged with repeated use and also carry heat away from the joint. Carbon is the most suitable material for clamping the parts, as it is not readily affected by the brazing heat and does not conduct heat away from the joint as rapidly as does metal.

When carbon is used, it must be backed up with metal to provide a clamping mechanism, and again the pliers furnish an answer as the simplest method of handling the carbons. By mounting carbons in a pair of pliers, a tool is provided for holding the joint members together during the brazing operation.

Heat can now be applied to the joint by passing an electric current through the carbons as they hold the work. The carbons heat up and in turn pass the heat on to the parts, bringing them up to a suitable brazing temperature.

The basic tool furnishes the means of holding the parts, heating to brazing temperature and maintaining pressure across the joint to take up any sag caused by melting of the brazing alloy or straightening and settling of parts under heat. It also cools the joint more rapidly so the operator can proceed.

Development of this equipment indicated the need for a number of modifications to the simple pliers for mounting the carbons. Generally, it is more desirable to modify the pliers so the carbons open up, permitting ease of assembly and ready removal from the work, when the operator squeezes the handles. A spring closes the carbons on the work and maintains pressure. When the operator must apply pressure, it tends to vary and different heating conditions then develop.

Contact Affects Heating

To increase the range of work, it is necessary to incorporate a paralleling device into the construction so the carbons, with varying joint thickness, can always be adjusted parallel, giving the maximum joint area in contact with the carbons.

The heating obtained from carbon is a function of the current squared; therefore, high currents are required, depending on the size of the conductors being brazed. It has been found desirable to make the tongs in several sizes for maximum operating convenience.

When making joints on small conductors, large tongs become too clumsy and will not get into close quarters because of size limitations. Small tongs will not be suitable for brazing large joints as they cannot supply heat at a rate greater than the conduction away from the joint. A balance must be maintained between what service conditions indicate will be suitable and recommended design.

The weight is kept low by using a light conductor and threading it through a hose so it can be water-cooled. This results in some loss of power, but is justified because of the convenience and adaptability.

Several variations of this method are in use for special jobs. One variation is to use a large carbon block connected permanently to one terminal of the transformer. The other terminal of the transformer is connected to a copper bar used as a finger to hold parts against the

Series connections on shell-type transformer coils are made close to insulation and finish dimensions must be held. This 40-kva. unit can braze parts up to 1¼x3 in. and has a water-circulating system

Carbon brazing on transformer coils means close-quarter work. Wet asbestos mud and paper protect the insulation from the heat generated in the carbon and parts

External connections from the stack of pancake coils are made with copper rods. Leads are here being brazed to the transformer winding taps. Other types of brazed connections are shown on the table

carbon. Thus, the circuit is completed and parts heated to brazing temperature.

Another variation is the direct opposite. The finger is of carbon and the heat is generated in it to heat the parts. These variations are more rapid to use than tongs and are useful for high-activity, repetitive operations where parts are relatively light.

To produce high-quality brazed joints consistently, parts must be clean, in intimate contact at the point to be brazed and not moved during the brazing operation, particularly during the cooling cycle. For a neat appearing joint, parts must be well aligned.

In any method of heating, the joint area must be cleaned, before the assembly operation can proceed, by anyone of a variety of methods, depending on the particular application. Where the application permits, bright dipping in a mixture of nitric and sulphuric acid is probably the most rapid. Sanding or wire brushing are acceptable methods and either lend themselves to hand operation or they can be mechanized when production warrants it.

Some work will require scraping to assure a properly prepared surface. In cleaning, all foreign material, such as varnish, grease, scale or dirt, must be removed so the base metal surface is exposed. When this condition is attained, no flux is needed as the brazing alloys have sufficient fluxing action to cope with oxidation occurring during brazing.

Improperly cleaned parts will not permit "wetting" of the joint surfaces; consequently, an improperly bonded joint with low strength and high resistance would result. Where joint components are of thin sections, they must be straightened after the cleaning operation. Heavy sections do not generally distort during cleaning but must be flat so they will lie in intimate contact.

Modified Overlap Joints

All well designed joints will be basically the same as the simple overlap or some variation thereof. In making joints composed of single conductors, the procedure is to clean the parts and align them, place the brazing tongs in position and pass current through the carbons, heating the component parts to the proper temperature.

Brazing material can be added in either of two ways—in the form of a ribbon between the parts or externally from outside the joint. Preplacing a thin strip of brazing agent between the parts generally permits more rapid brazing, as the brazing agent heats up with the work.

When sandwiched in the joint with the maximum area exposed to the heat, the preplaced strip will reach temperature more rapidly than with the brazing agent added from the outside. When joints made up of multiple conductors are brazed, it is always desirable to preplace a strip of brazing agent between layers. More brazing agent, if required, can be added externally as the joint is completed.

A properly brazed joint must have the components in intimate contact and must have pressure on the joint when the brazing agent melts and until the brazing agent has solidified and developed strength. Capillary attraction is an important factor in obtaining flow of the brazing material into the joint.

Best results are obtained with a gap of 0.002 to 0.004 in. This size of gap will allow the brazing agent to cover the joint rapidly, regardless of whether the brazing agent is preplaced in strip form or is fed from the outside. Thin films also develop maximum strength and conductivity.

Larger gaps do not furnish capillarity to assist the flow of brazing agent into the joint, and considerably more brazing agent is required to fill them. Moreover, they usually result in poor joint coverage and only a portion of the joint area is brazed with a cast-type alloy of low strength and high resistance. The brazing material, when cooled from the liquid in thick sections, develops the typical undesirable cast structure which is not present in thin films.

DIAL FEEDS SYNCHRONIZED BY AIR

BY JOSEPH F. BUDNICK

Flexibility of air systems is ideal for synchronizing dial feeds for small parts and controlling work at each station

PRODUCTION of awkward or small parts can frequently be aided pneumatically. Minute work requiring secondary and assembly operations is often severely limited as to cost. Special machines are generally made for such work from cold-rolled steel plate with standard parts wherever possible.

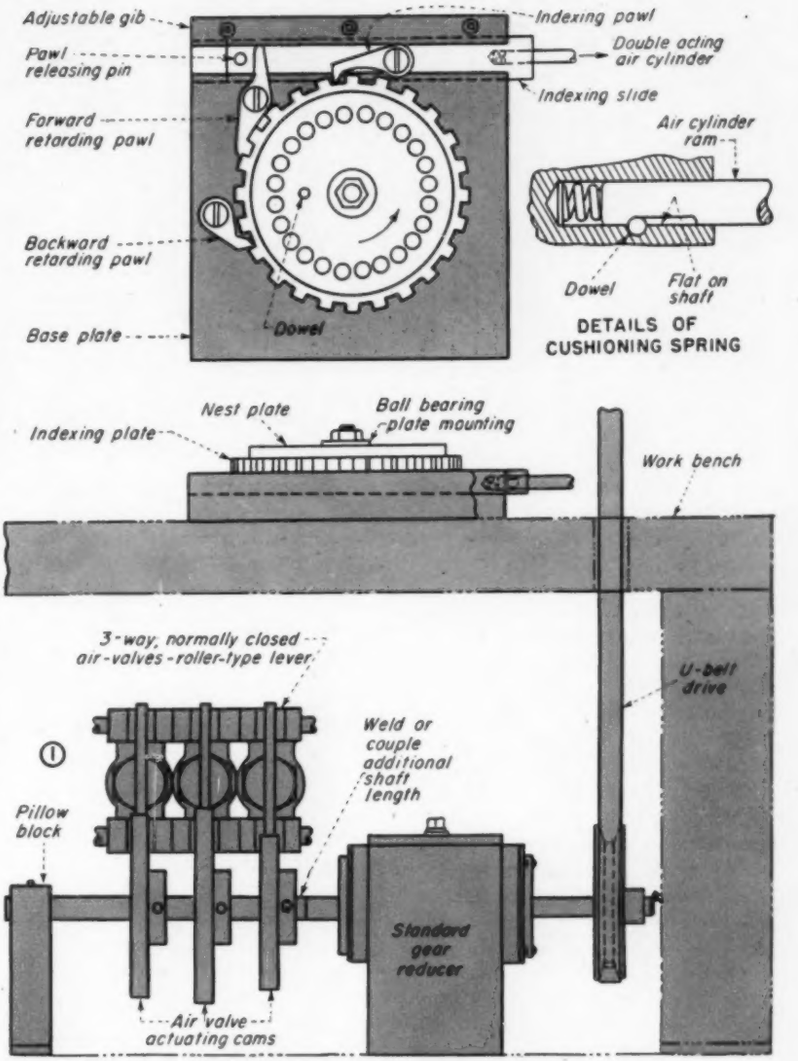
Much of the mechanism is necessary to synchronize moving parts and for transfer of mechanical reactions. An air system, such as the one illustrated, will help to avoid complex mechanical arrangements by taking advantage of the inherent flexibility of air.

One or more indexing dial plates, locked at each working position by retarding pawls, are indexed to a new position by the reciprocating action of a gib-restrained slide. The slide is moved through a cushioning spring by the ram of a double-acting air cylinder.

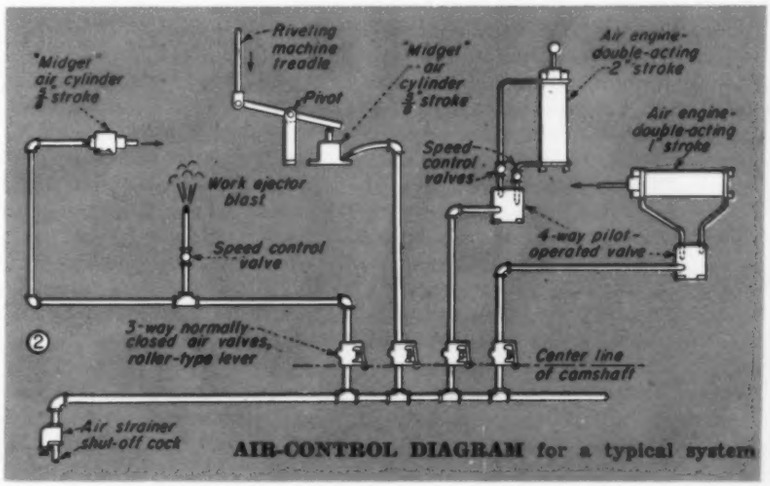
The slide carries a power pawl which does the actual indexing and a pin mounted so on the return stroke it strikes an extended dog which is part of the forward retarding pawl. The indexing plates are notched for pawl engagement. A dial plate, attached by screws and dowel, has locating holes for symmetrical objects, or nesting plates or pins for odd-shaped parts. Parts can be fed into the dial plate manually or through a hopper at one of the stations. All moving and locating parts are protected by a metal cover except the dial plate itself.

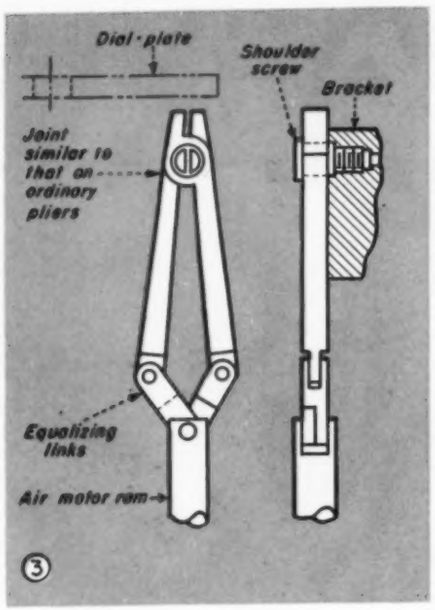
Several operations may be performed at the individual work stations by standard machines such as riveting and spinning machines, bench power presses or special processing fixtures. All the machines must be synchronized either mechanically or through cam-actuated air valves.

Whenever possible, "Midget" air cylinders are used for tripping triggers or treadles of the machines. A careful cam-cycle diagram should be worked out to control simultaneous mechanical movements through the same master valve and manifold, to synchronize the other movements in their correct sequence and to

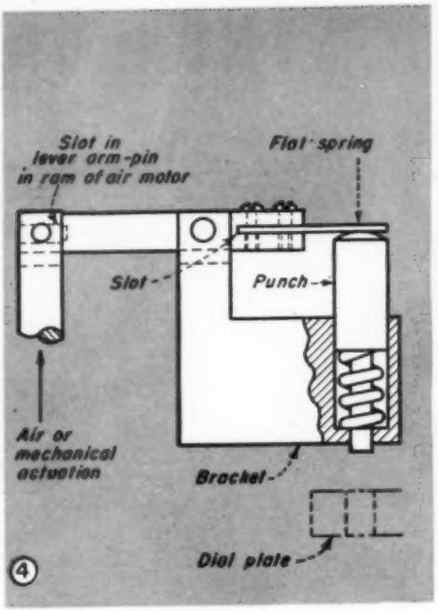


AUTOMATIC DIAL FEED is pneumatically operated by double-acting air cylinder controlled by camshaft rotating at speed determined by the work cycle of the parts in the dial

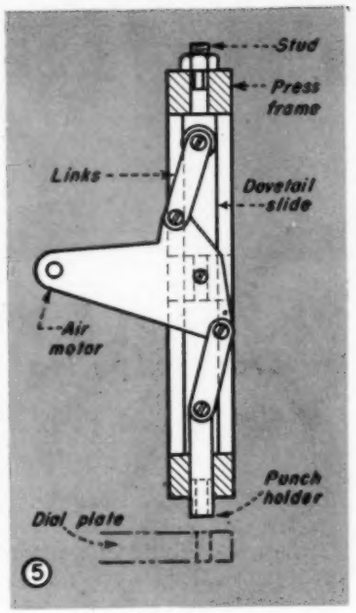




AIR-OPERATED TONGS are used for crimping, clamping or similar operations on work brought into position by the dial plate



ASSEMBLING PUNCH has flat, stiff spring as a safety measure to prevent punch breakage if the dial plate is not properly aligned



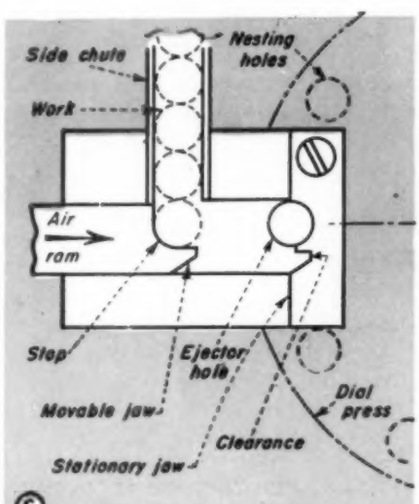
TOGGLE PRESS for assembling, crimping, upsetting or other work gives relatively high pressure, gradually applied

allow sufficient dwell time before and after indexing.

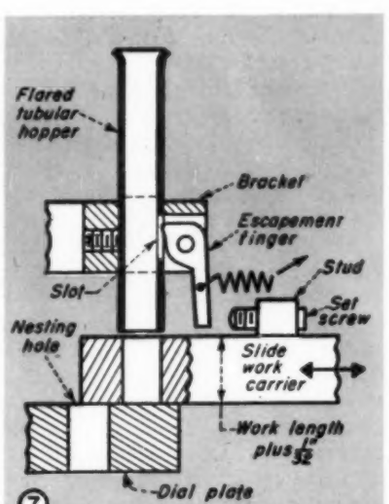
Machines at the work stations, clamps and other air-operated tools are individually controlled by their respective 3-way, lever-type, air-control valve in contact with one of a series of cams. The cams are mounted on a shaft and driven through a coupling connected to the output shaft of an approximately 25 to 1 gear reducer. A sheave is mounted on the input shaft end of the reducer and slowed down in a 2 to 1 ratio from a ¼-hp. electric motor. Because little power is actually required for driving the camshaft, the sheave may be driven from a two-grooved sheave mounted on the crankshaft of one of the motorized machines at the work stations.

One complete revolution of the camshaft is equal to the duration of the work cycle. The dial indexing frequency is determined by the sum total of the time required (in seconds) for the slowest operation, plus the total operational time for all operations not acting during this time, plus time for indexing, plus dwell time. This total divided into 3600 gives the number of revolutions per min. required for the camshaft.

Of prime importance in extending the efficiency and usefulness of these machines is the use of hopper, chute and slide feeds. Feeds must be positive in action, non-jamming, and must feed only one piece at a time. Of complementary importance are the auxiliary tools, such as crimping or staking jaws, forming punches and dies. A pressure regulator in the line makes it possible to obtain the exact pressure needed.



CHUTE FEED for short work is loaded with pieces side by side



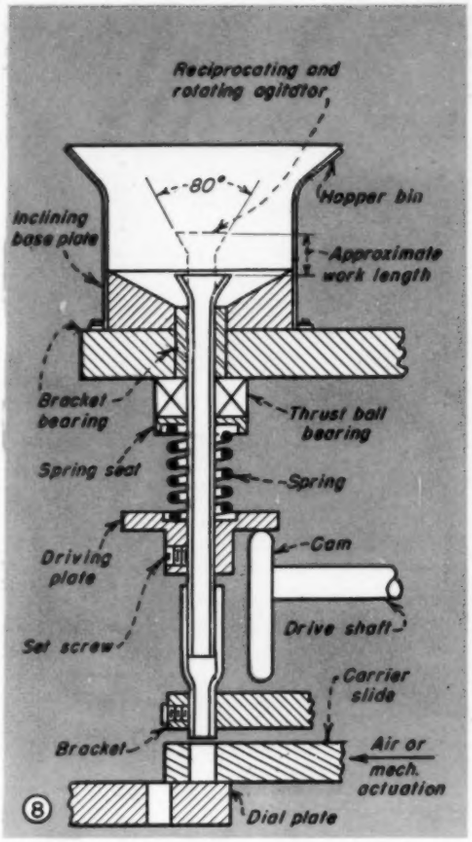
VERTICAL FEED for longer work has escapement to drop one piece on each forward stroke of slide

A few practical illustrations showing basic applications are in Figs. 3 to 9.

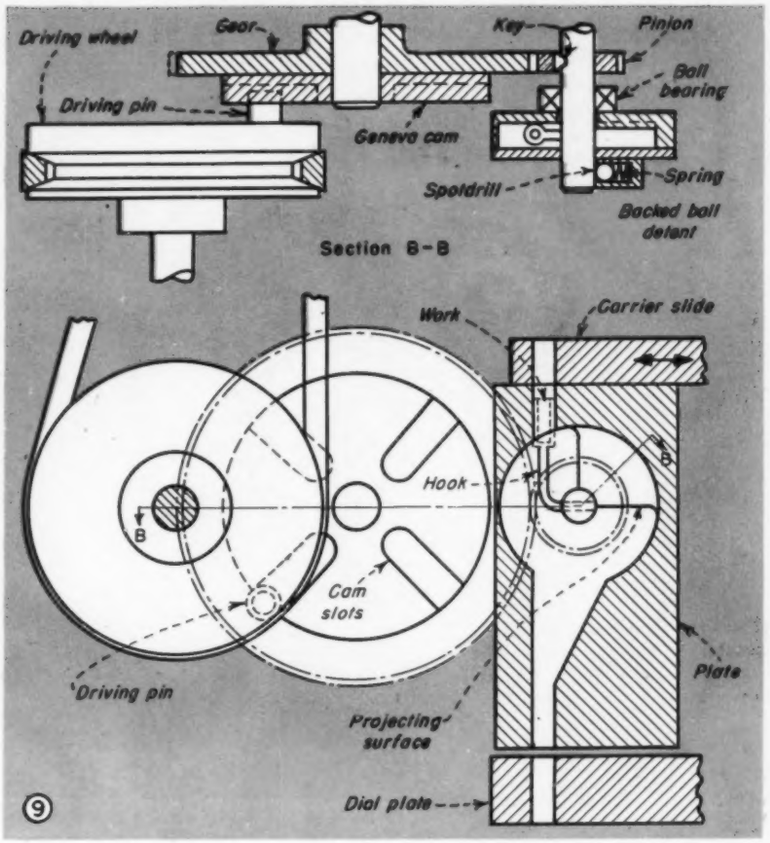
The usual work-feeding fixture (Fig. 7), chute type, consists of an air-cylinder or mechanically actuated slide, carrying the movable jaw which has a cut-out to act as a stop for the workpiece in its descent from the chute into position against the stop in the movable jaw. This cut-out is slightly less than the diameter of the piece to assure correct displacement and to move only one piece at a time.

The movable jaw carries the work against the stationary jaw where the operation is performed. As the movable jaw returns to its former position, the work is restrained by a drag-off finger—a flat spring which permits the work to be located in the stationary jaw but prevents its removal, causing the work to drop through an ejector hole.

With this type of inclined side chute, care must be taken to keep the angle at least 40° from the hori-



TUBULAR HOPPER FEED for work longer than one diameter has agitator which rotates and reciprocates through a distance approximately equal to the work length at about 180 strokes per min.



SMALL SHELLS are fed closed end down by this mechanism. Shells that are closed end up fall onto the hook and are inverted before being dropped into the dial plate when the hook makes a revolution because of the action of the Geneva cam

zontal. The part of the chute leading to the movable jaw should curve down sharply. The chute should be kept at least ¾ full for good results.

Considerable difficulty may be experienced in this type of feed when the work length is greater than its diameter. This difficulty can generally be overcome by the tubular hopper and escapement mechanism in Fig. 7. A vertical feed tube with flared top for easy filling is filled with round or other symmetrical work and the feeding slide is moved so the hole in the slide lines up with the chute. The lowest workpiece is free and falls by gravity into the hole in the carrier slide which carries it in line with the hole in the dial where it falls into place. The following piece in the chute is held back by the escapement finger.

Large shells can be hopper fed by several well-known methods. However, for very small shells these methods do not work because of the small size involved. Fig. 9 shows a mechanism for feeding a shell closed at one end with the closed end down.

A continuously rotating sheave carries a driving pin on its outer edge, which engages in slots in a Geneva cam, mounted on the side of a gear, which transmits this intermittent rotation to another gear which is ¼ the diameter of the driving gear. Hence, for every ¼ revolution of the large gear the small gear makes one complete turn. This pinion gear is in turn keyed to a shaft which carries a hook.

A work carrier similar to the one in Fig. 7 carries the shell and drops it against the end of the hook. If the shell falls closed end down the hook acts as a stop. When the hook is indexed 360°, the shell falls into the dial plate. However, if the shell falls closed end up it drops over the end of the hook. When the hook is indexed 360°, the shell is carried along for the first 180° until it falls off by gravity with the closed end down. A projecting surface helps to strip the shell off the hook. A spring-backed ball detent locks the hook into position.

CORRECTION

In the recent article "Equations for the Normal Profile of Helical Gears," by Anthony F. Zamis, several errors occurred, some in proofreading and some in original manuscript. They are:

In equation (2) $\cos \alpha$ should be $\cot \alpha$.

In equation (3) $\cos \alpha$ should be $\cot \alpha$.

In equation (7) $\tan \psi$ should be $\tan \psi_b$.

In equation (10) x should be **X**.

Under the sample calculation—

0.36997023 should be 0.36397023

1.023161757 should be 1.02361757

$X_1' = (X_1 \cos \phi_n) - (Y_1 - \sec \phi_t)$ should be

$X_1' = (X_1 \cos \phi_n) - (Y_1 - \sec \phi_t) \sin \phi_n$

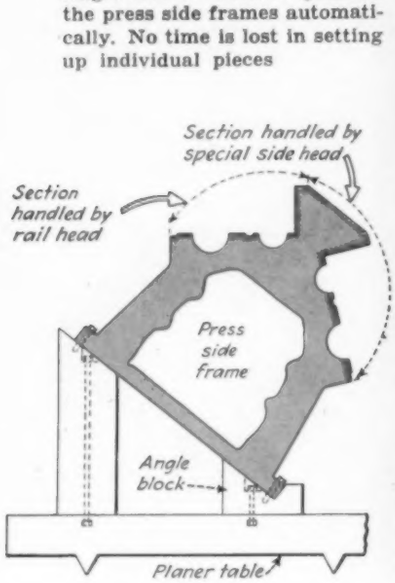
$Y_1 - \sec \phi \cos \phi_n$ should be

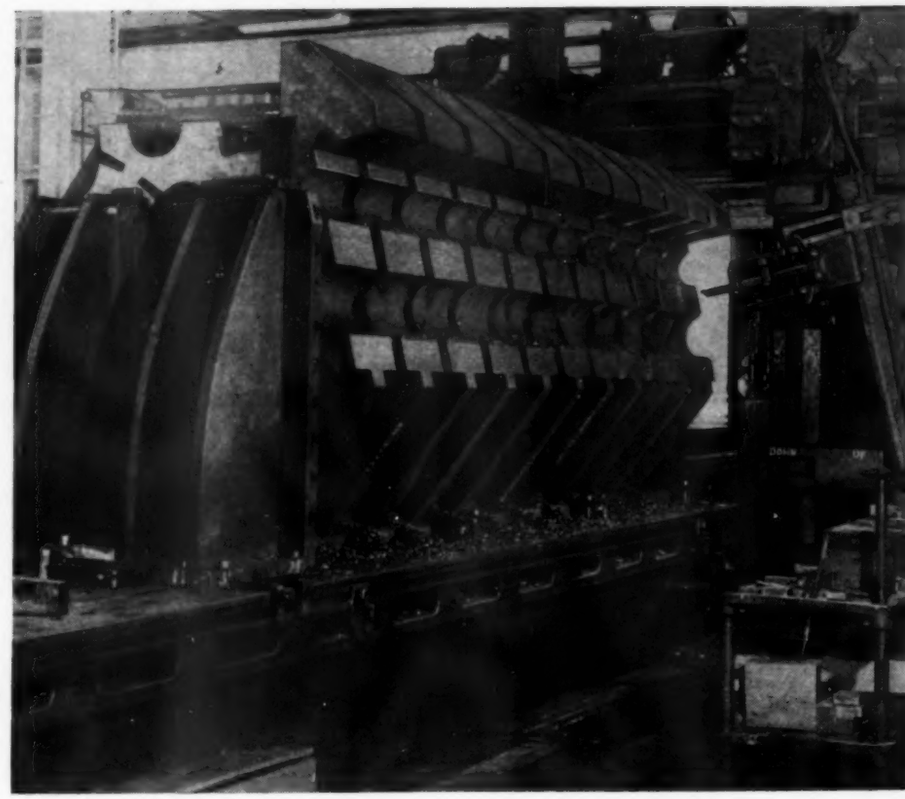
$(Y_1 - \sec \phi_t) \cos \phi_n$

The quantities 0.03928015 and 0.04139777 should both be minus quantities.

$2.81907786 \times 0.03716253$ should be $2.81907786 (-0.04139777)$

Angular surfaces on press side frames are machined by the side head under control of a taper attachment. Horizontal surfaces are planed by the rail head in the same work setting. Angle blocks (below) position the press side frames automatically. No time is lost in setting up individual pieces





Ideas That Save Planer Time

BY J. J. MADDEN, SUPERINTENDENT, DUNELLEN PLANT, R. HOE & CO.

SEVERAL years of enforced delay in publishers' replacement and modernization programs caused an avalanche of orders to descend on printing-machinery companies shortly after the war's end. R. Hoe & Co. found itself with production time sold for years ahead. At the Dunellen plant, which produces the press beds and side frames, the problem was to use planer equipment effectively on "mass-production" lots. Several ideas for getting more work out of various-sized planers were developed.

Main side frames are castings weighing 1½ tons apiece. The prewar method of machining a number of surfaces at various angles involved setting up 30 pieces on a 120-in. planer and taking a cut, then resetting to get a surface at a different angle.

The postwar method makes use of a smaller machine—a 72x72x32-ft. Pond planer—and machining all surfaces at one work setting. Forty pieces are set up at once. One operator is required instead of two, the big 120-in. machine is released for other work, and the savings amount to 50% in manhours and 40% in machine hours.

All surfaces on the press side frames are machined at one setting because of two circumstances. First, the frames are positioned at an angle upon special angle blocks on the planer table. Thus, bearing-cap seats on one shoulder of the frame are caused to lie in a horizontal plane so they can be machined by the rail head. Second, a taper attachment was built so the surfaces on top and the opposite side (now lying at an angle) could be machined with the side head.

The taper attachment consists of a short and long block fastened to the housing, and a guide bar doweled to the ends of the blocks. The crossfeed screw in the side head is removed and reinstalled in an auxiliary slide, which is bolted to the slide of the side head. This auxiliary slide is equipped with a shoe, or nut, that rides in the guide bar, and which can be clamped at any point in the auxiliary slide.

To plane the bearing-cap seats and the top surface of side frame, the side head is set at the start of the cut by cranking the crossfeed screw. Then the nut, or shoe, is clamped so the distance between the tool tip is constrained to move at an angle as the side head is moved downward. Thus, machining is done in a plane at the correct angle to the vertical.

Infeed of the side head is required when planing the keyway in a bearing cap seat, and also when cutting an 8½-in. wide face square with the top surface of the frame. To obtain infeed, the nut on the auxiliary slide is unclamped. The rail head is turned to the same angle as the side head. Sprockets are applied to the ends of the crossfeed screw of the rail head and the crossfeed screw of the side head (now installed in the auxiliary slide). By applying power to the rail-head crossfeed, a sprocket chain is made to drive the side-head crossfeed screw. Thus, the side head is fed inward, and the keyway or the vertical face is planed square with bearing-cap seats.

In another setup on a Cincinnati Hypro 96x72x24-ft. planer, 40 tons

of magazine side frames (16 pieces) are machined at one setting. Both heads are employed to plane all seats for connecting braces and miscellaneous pads. In this case, pieces are stacked vertically on the planer table, between angle-type end brackets tied together with bolts.

In fact, manufacturing methods instead of job-shop setups have been applied wherever possible. In the case of magazine frames, the operation sequence is:

1. Cut to shape, two pieces at a time, on a pantograph flame-cutting machine. Billets weighing 6 tons and measuring 6 in. thick are used. Stock allowance is 1/16 in. where no machining is to be done; ¼ in. per side for bored holes.
2. Flanges are welded on top and bottom.
3. The frames are stress-relieved.
4. Both sides are milled or planed, four to six pieces at a time, on a 96x120-in. planer.
5. Cylinder holes and gear-center holes are bored in a fixture.
6. Magazine frames are set up in a fixture on a Sellers horizontal boring machine, and 250 holes are drilled in a pair. Most holes are drilled through only one piece at a time (the piece is 5½ in. thick). However, three holes, ranging from 11 to 12 in. in diameter must be bored in exact alignment, and two pieces are placed together.

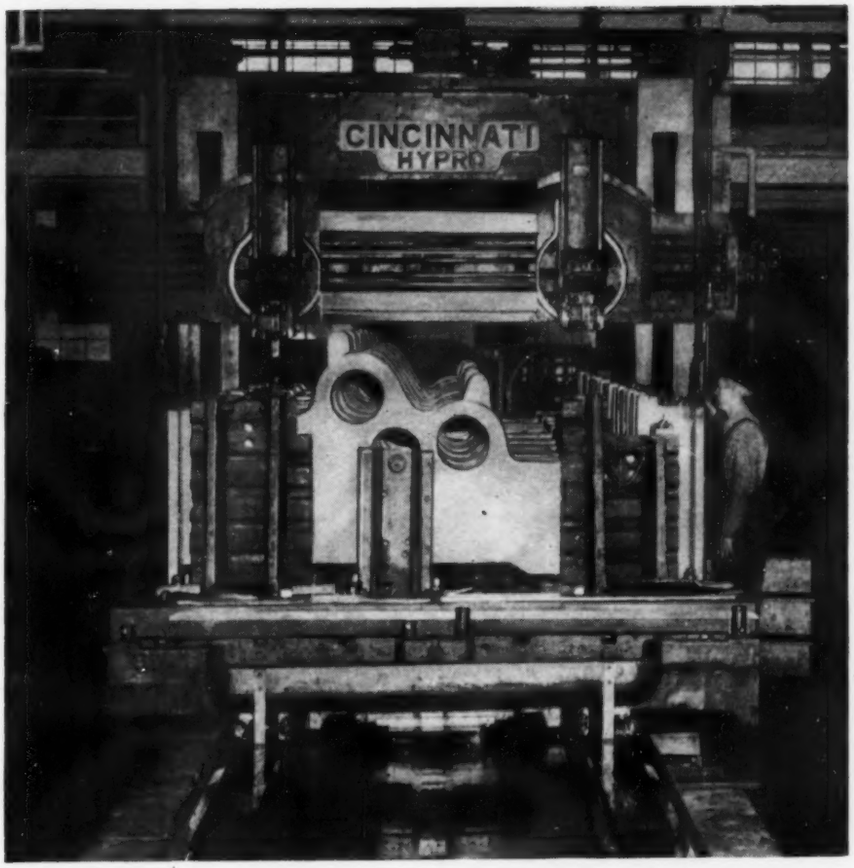
Cheaper in Two Ways

Bedplates are milled seven times faster by a change in shop procedure. As many as 12 bedplates, each 15 ft. long, are assembled in line for certain printing presses. The T-slots in the bedplates must align. Hence squareness of the ends is essential.

Formerly, the ends were milled square with the T-slot, using a 108-in. Ingersoll served by two men. Hand drilling and spot facing the bolt holes was done as a separate operation.

Currently both jobs are handled on a Cincinnati-Gilbert 3½-in. sidehead milling machine. Comparative labor figures are: old method—54 manhours, (including 16 hr. of machine time on the Ingersoll); new method—eight manhours. The Ingersoll machine, which bears a shop rate three times that of the Cincinnati-Gilbert, is now used on more pressing work.

By such means as the above methods, the task of producing modern printing equipment in volume is being realized.



End brackets and tiebolts securely hold a 40-ton load of magazine side frames while various seats and pads are planed

Bedplates are located square with the spindle of the Cincinnati-Gilbert by angle blocks fitted to the four T-slotted work supports. Four angle blocks (on one side of work) are permanently fastened; those on opposite side are slid against work and clamped with screws

Switch assembly conveyor has 20 trolley-mounted fixtures and passes over a steel-topped work bench for tools and switch parts. Under normal conditions each fixture makes a complete circuit of the conveyor every 72 min. Estimates show this conveyor makes possible a saving of about $18,000 during the first year of operation

LOOPED CONVEYOR SAVES SPACE

BY ARNOLD RISTOW, SUPERINTENDENT, HAWLEY SHOP, ALLIS-CHALMERS MFG. CO.

Good planning saves floor space by looping an 80-ft. conveyor through assembly and test with no danger to assembly workers

DEMAND for two sizes of a special pneumatic heavy-duty switch assembly has recently expanded materially. Additional floor space could not be made available, so an unusual conveyor was developed to speed the assembly, inspection, and electrical testing of these units.

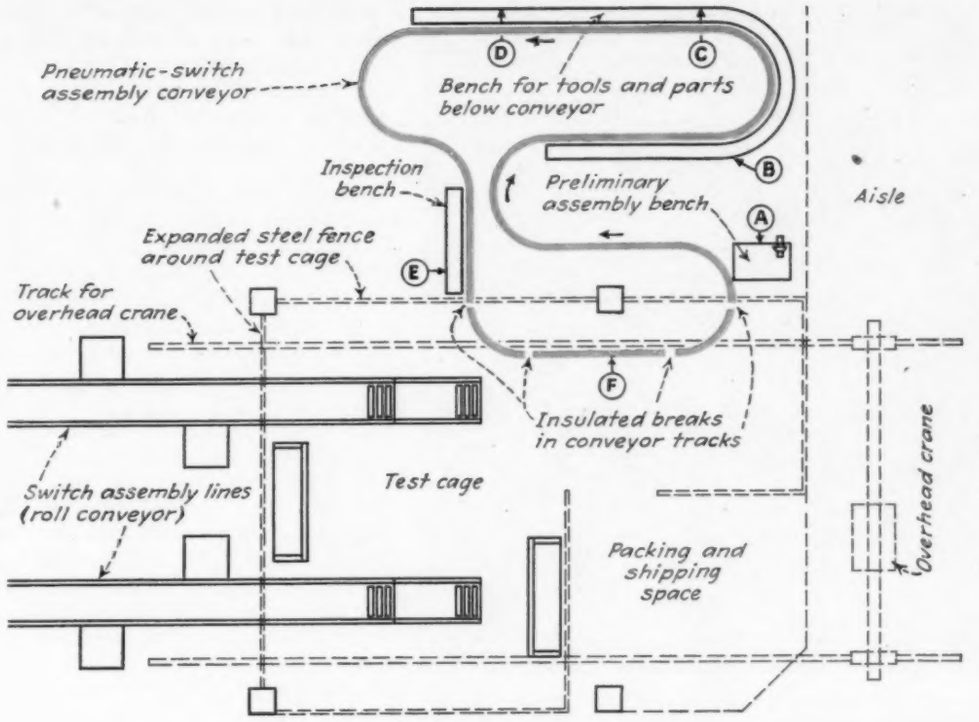
Total conveyor length of 80 ft. has been installed in a 24 × 20-ft. floor area by looping the conveyor tracks. Special trolley units support the 20 adjustable fixtures on which the switch units are assembled and tested.

The conveyor proper consists of a welded steel frame on which are mounted two standard monorail tracks. The upper track is suspended from overarms, while the lower track is mounted on its side with supports bolted to the uprights of the frame assembly.

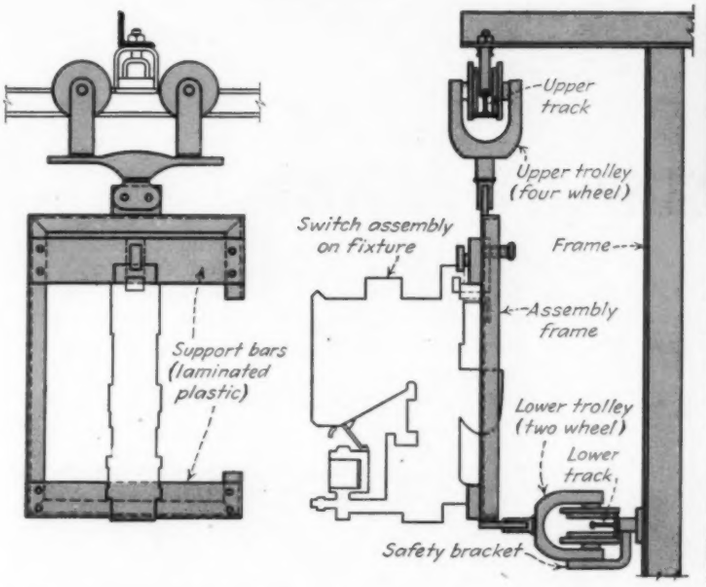
Both conveyor tracks have openings on either side of the electrical test station to insure complete electrical insulation of the assembly portion of the conveyor from the test tracks. This protects assembly workers against electrical shocks while completed switch units are being tested.

The upper track is 66 in. above the floor, bringing the trolley-supported assembly fixtures to a convenient working height for all necessary operations. Benches are provided around the conveyor for the four assembly and the final-inspection operations.

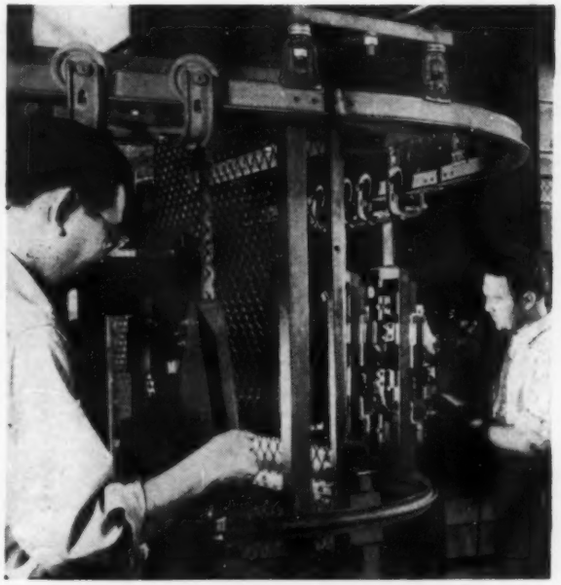
By prepositioning material in trays located at each station, handling of component parts in skid boxes with its attendant waste motion and employee fatigue has been largely



The 80-ft. conveyor is looped through switch assembly and the test cage. Assembly stations *A*, *B*, *C* and *D*, spaced so there is no interference with other operations, and final inspection station *E* are insulated from test station *F* by breaks in the conveyor tracks. Two roller conveyors (lower left) feed other assemblies to test



Each conveyor fixture is supported from the upper track on a four-wheel trolley, while the lower two-wheel trolley keeps the fixture from swaying. Laminated-plastic support bars are adjustable for the two sizes of switches assembled on the conveyor



Conveyor tracks, broken as they enter the test cage, are held in alignment by a laminated-plastic support arm over each break. Tester in background is connecting leads to an assembly for final test

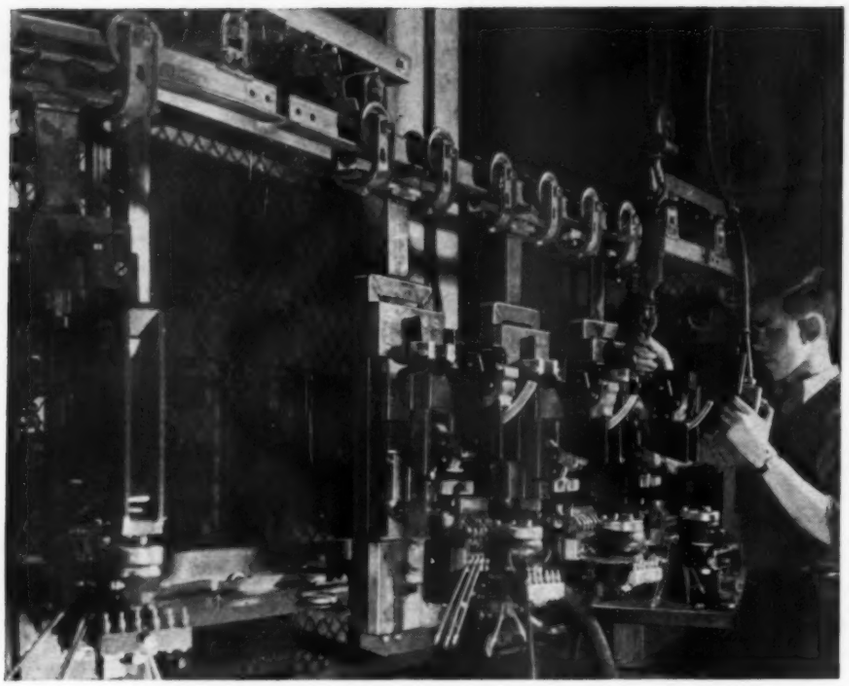
eliminated. Better individual working conditions have resulted in greater harmony among operators.

Each assembly fixture has two adjustable laminated-plastic support bars on which the switch units are mounted. These bars are moved to suit the two sizes of switches. They also provide additional insulation against electrical shocks.

The upper trolley, from which each fixture is suspended, is of the four-wheel type. The lower two-wheel trolley prevents fixtures from swaying during assembly, inspection or testing. A safety bracket, welded to the lower side of this trolley, prevents it from swinging away from its track.

The test cage is surrounded by an expanded steel fence in which two openings permit movement of conveyor carriers into and out of the cage. To insure safety of assembly workers, carriers can be moved through these openings only by the final inspector or by a test operator. Swinging locks on the test section of the conveyor have been provided to prevent carriers from moving onto or off the test track unless the locks are raised by hand.

The four assembly stations are spaced along the conveyor so each operator has sufficient room to perform his work, even though there may be some delay at one of the other stations. The assembler at the preliminary assembly bench puts



Conveyor track in the test cage has swinging locks to stop carriers until locks are raised by hand. The tester shown is lifting a completed switch fixture with hoist hook, spring loaded so a lifting load can be applied to the switch before clamps holding it to the fixture are removed

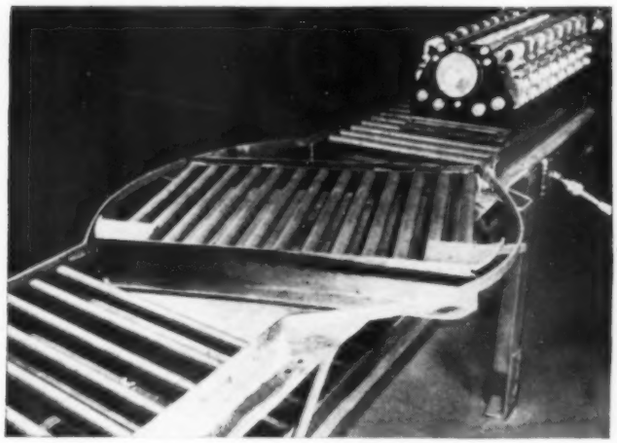
together the main frame of the switch, and then mounts it on one of the carrier fixtures. This carrier then is moved by hand along the conveyor to intermediate stations for mounting various parts of the assembly.

At the fourth station an air hose is connected to the assembly so the final-assembly operation can be performed with power available for operating the switch. This insures that parts are properly aligned and that the switch is in operating condition when it reaches the final inspection station.

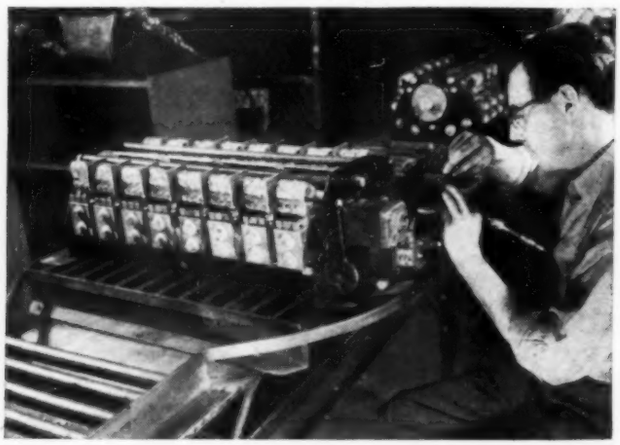
At the test station in the cage two men perform all necessary testing operations and remove switches to lift-truck boxes for delivery to the shipping department. A special spring-loaded hook is provided for the hoist, so the switch assembly can be fully supported by spring tension before it is unclamped from the assembly fixture. This prevents accidental dropping of the switch assembly when the clamps are removed and the assembly released from the fixture.

TURNTABLES SIMPLIFY ASSEMBLY

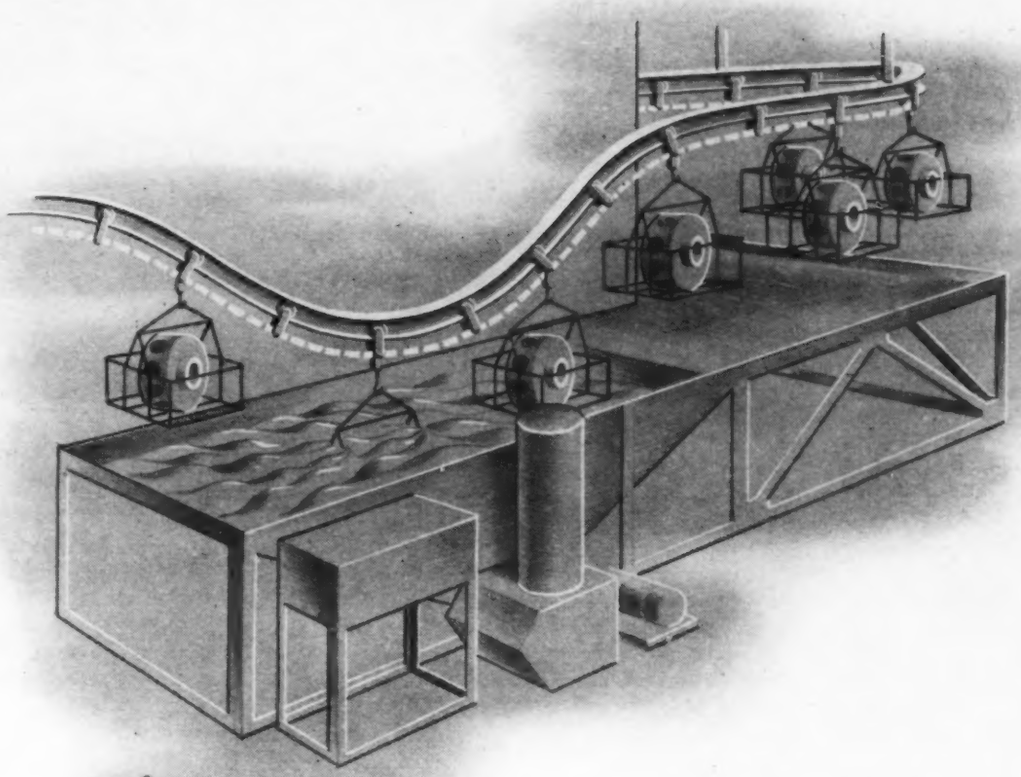
Several roller-conveyor lines have been installed in the Hawley Shop for assembly, inspection and testing of heavy-duty pneumatic transfer switches and similar control assemblies. These switch units are mounted on steel plates for movement along the conveyors. At several assembly and inspection stations, operations have been simplified by providing turntables in the conveyor lines. With these units, switch assemblies can be turned on the conveyor to suit the convenience of the men working on them. Operations are easier to perform with less waste motion, fatigue is reduced materially and production has been increased.



Each turntable in the line can be set at any desired angle for assembly or inspection operations. Rollers in these units are 15/16 in. in dia., 20 in. long. An inclined roller conveyor under the assembly conveyor returns the steel fixture plates from test cage to head end of the conveyor



Heavy-duty pneumatic transfer switches and similar assemblies are final-inspected at this turntable station before the units are passed through the fence of the test cage nearby. Guide rails around the turntable position prevent accidental movement of the assembly off the turntable when it is out of line with the conveyor



How to Clean Metals

BY HARRY S. WHAREN, ASSOCIATE EDITOR

Too much importance cannot be given to metal cleaning. On it depends the success of many fabricating and processing operations, durability and beauty of the finish and even, as with successful prevention of hydrogen embrittlement, the required properties of the base metal. But all too often it is regarded as just another necessary evil, and given corresponding attention, rather than as an independent process that can make or break the product. Fortunately, this attitude is changing in progressive metalworking plants, where now as much care is taken in controlling concentration of cleaning solution and procedure as those of plating or enameling baths. This report, which treats the cleaning of steel particularly and non-ferrous metals to only a limited extent, is presented to encourage metalworking executives to pay more attention to this most important manufacturing process.

Metal Cleaning

AS A MANUFACTURING PROCESS

WHY do we have to clean metal surfaces? And when do we clean them? The seemingly obvious answer to these questions is: To remove dirt when these surfaces are dirty.

But process cleaning involves far more than this implies. It depends on the nature and adherence of dirt and the degree of cleanliness required. As treated herein, it prepares metal surfaces for subsequent operations and improves their appearances, making them more attractive and salable.

Preparation for subsequent operations, for example, may involve the cleaning necessary before and after annealing operations between press draws. Or it may be that necessary before operations such as nitriding, cyaniding, electroplating, phosphate coating, painting, enameling and application of other protective or decorative coatings.

Broadly speaking, these coatings may be of the organic type such as paints and lacquers, inorganic such as vitreous enamels, and inorganic of metallic character, each of which requires a certain degree of cleanliness.

What Is Dirt?

Dirt to be removed from metal surfaces may be a single substance or a complex mixture intentionally or unintentionally applied to the work. The drawing compound, for example, that permitted deep draws in the press room is, to the cleaning department, only another impurity that must be removed from metal surfaces.

Dirt from the cleaning viewpoint consists of organic substances, solid particles and products of corrosion. Principal organic impurities are oils, greases, soaps and chemicals from cutting and quenching solutions; drawing, polishing and buffing compounds; and similar materials used in processing. Furthermore, oils may be animal, vegetable, mineral or compounded, while drawing compounds may be heavily pigmented.

Solid dirt particles are the metal chips, abrasive grains, drawing-compound pigments and shop dirts of all kinds that are naturally picked up during fabricating and in handling. Corrosion products are the oxides, mill or heat scale and rust, and various sulphides, basic sulphates, carbonates and chlorides that may be present.

All these kinds of so-called dirt affect selection of the cleaning agent and method, because a cleaner suitable for only an oily surface would not suffice for a surface covered with oil and solid dirt particles or with scale. But not only does the kind of dirt affect selection of the cleaner. Its adherence to the surface is equally important in determining the required characteristics of cleaners—their wetting power, detergency, emulsification, penetration, saponification, defloculation and related properties.

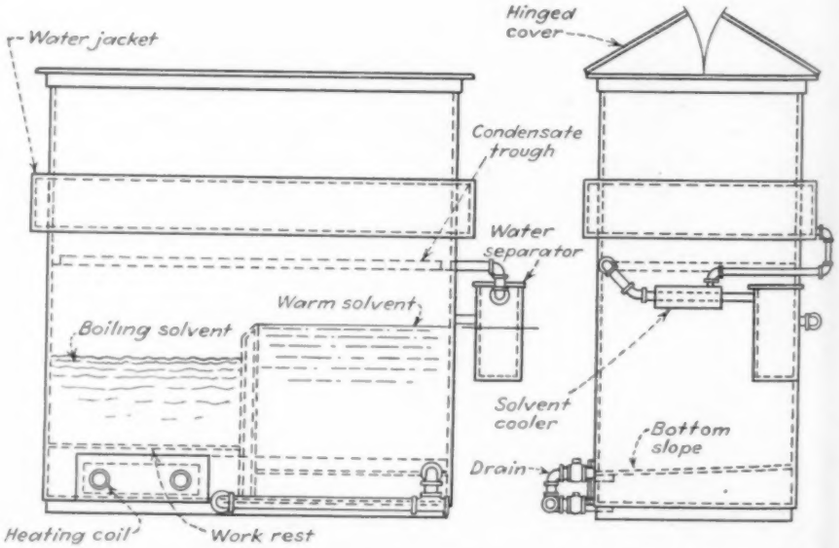
Important too in selection of cleaner is the degree of cleanliness required of the metal surfaces. An organic coating requires the removal of all visible surface dirt, while plated inorganic coatings demands removal, not only of all traces of oils, greases and solid particles, but also of oxides and other corrosion products.

Such a surface should be "water-break" free, that is, with no oil residues that would cause a break in a water film. In fact, any impurities that might affect the adhesion, appearance and protective requirements of the plating should be removed, although it is recognized that successful plating can be done over some surface film. The physical act of transferring parts from the rinse after a pickling solution into a plating bath results in some oxidation, and even the inhibitor in a pickling solution usually leaves a slight film on the metal.

Moreover, it should be recognized that there is no simple test to ascertain closely the degree of cleanliness of a surface. Visual inspection is not infallible, because the "water-break" test is not always a reliable indicator, failing, for instance, when colloidal films, as from decomposition of silicates in an alkaline cleaner, are deposited on the work. So it is immediately apparent that cleaning materials must be suited to the cleanliness required. Rough paint jobs might require not even a so-called physically clean surface. In other cases, the cleaning agent may be called on, first to clean the surface and then to deposit on it a film to retard any corrosive action that might otherwise occur before the next processing operation. The cleaner must be tailored to the job whatever the dirt, condition of parts and final finish may be.

Controlling Dirt

Because selection of cleaner and success of the cleaning operation depend so much on the nature of the



LIQUID-LIQUID-VAPOR degreasing cleans parts by immersion in boiling solvent, rinsing in cooler solvent and final rinse in vapor. Condensed solvent drips from work into condensate trough, passes through a cooler and water separator into warm solvent chamber and overflows into boiling solvent

dirt, fabricating and cleaning should be considered one production problem, not a series of problems. Each process should be closely integrated with the others to afford economical, effective manufacture of the product in question.

Cleaning costs can be reduced in many cases by changing compounds employed in previous operations. While a drawing lubricant, for instance, should be selected on the basis of its lubrication performance, weld prevention, ease of application, stability and non-corrosiveness, altering its composition may aid its ease of removal without affecting its essential properties.

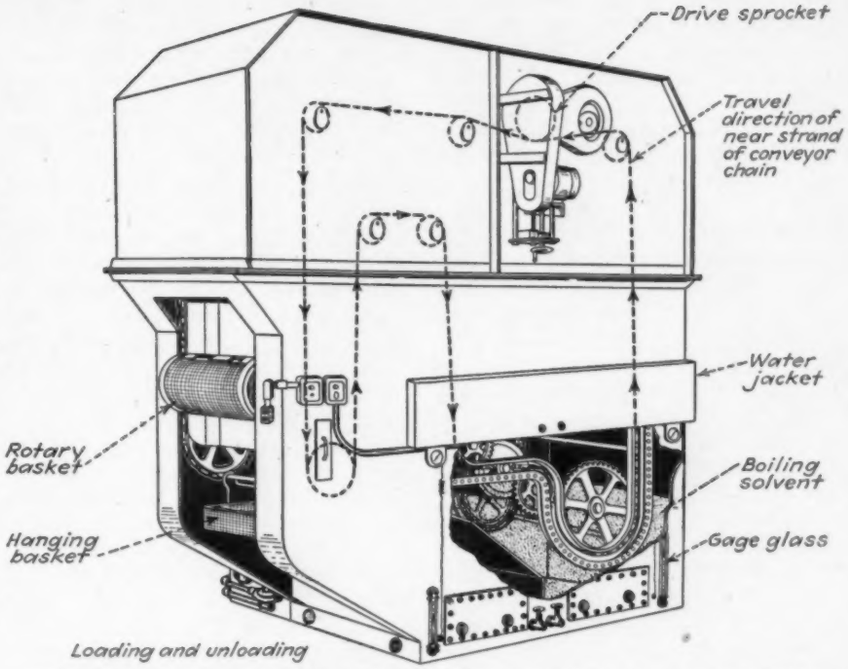
In the same way, many cleaning headaches after buffing may be avoided. Removal of heavy deposits of tripoli compounds has long been a major problem, especially when the work has been allowed to stand for some time after buffing and the compound has set on the work.

Cheap compounds generally employ substances difficult to remove to bind abrasive particles together, while better grades contain tallow, stearic acid or water-soluble binders. Even saponifiable binders are not too easy to remove, because the residue on buffed work is a mixture of burned binder, abrasive and metal particles, and insoluble soaps formed by action of the heat. But still there is considerable difference in their ease of removal as compared to inferior compounds.

Practically all of these compounds require extensive cleaning setups. Soak tanks with soap solutions, emulsifiable cleaners or two-phase mineral oil and alkaline mixtures may precede alkaline cleaning, solvent cleaning may be included in the cycle and even costly hand brushing may be employed.

Compounds having water-soluble binders, however, are more easily removed by rinsing in hot water only or by following the rinse by immersion in a weak sulphuric-acid bath.

Other such possible savings in cleaning costs are innumerable. If each job is given individual consideration and study from raw stock to finished product, cleaning cost, as well as the difficulty and number of cleanings, can many times be reduced with no corresponding increase in the cost of other operations. To reduce cleaning costs, reorganize preceding operations, conserve solutions, locate cleaning equipment in the production line and improve handling methods.



IMMERSION DEGREASER, loaded and unloaded at the same station, handles work in baskets suspended on a cross-bar conveyor. Rotating baskets, having an end gear meshing with ratchet type rack, process parts uniformly and save solvent because of better drainage and prevention of cross currents

Cleaning Materials and Methods

BECAUSE the dirt picked up by steel as it passes through processing can vary in characteristics so widely and even be combinations of entirely different types, no one cleaner can be applied for all cleaning jobs. The many "brand-named" cleaning materials on the market can be classified into four groups: (1) organic or hydrocarbon solvents, (2) self-emulsifying, or emusifiable, organic solvents, (3) alkalines and (4) acids.

Successful preparation of steel parts for subsequent operations may, and usually does, require use of more than one type. While either a solvent or an alkaline cleaner, for example, would effectively clean a part of oil alone, an acid cleaner would be needed if the part were to have a surface free of oxides.

Solvent Cleaners

One of the earliest and simplest methods is solvent cleaning by hand wiping, tank dipping or spraying. Cleaners of this type are kerosene, gasoline, naphthas, other petroleum spirits, Stoddard's solvent and even coal tar or aromatic solvents.

Purpose of solvent cleaning is to remove light coats of oil, grease and processing dirts. But wiping is considered essential in removing solid dirts, as the solvent has no effect on them. Surface condition produced is not physically clean, but the method is applicable to parts cleaned prior to inspection or assembly.

Solvent cleaning is versatile and inexpensive, requires little equipment and demands little skill in operators. Parts are wiped with solvent-wetted rags or dipped in solvent and wiped with dry rags or either dipped or sprayed with solvent and dried in an airblast. A particular advantage lies in the cleaning of delicate parts that should retain a slight oil film to resist rusting.

Disadvantages are many. Parts that should be entirely freed from oil and grease seldom are, because the solvent, in tank dipping, retains all oil and grease removed from preceding parts. As the oil content increases, parts come from the bath coated uniformly with oil.

Most of these solvents are considered toxic, especially if non-inflammable. Others are inflammable,

with low flash points that make it advisable to have adeqaute fire preventive and protective devices installed on the equipment. Not least of the disadvantages is the possible dermatitis that may result from continued exposure and removal of oils from the skin.

Vapor Degreasing

A development of solvent cleaning, vapor degreasing with chlorinated hydrocarbon solvents has far surpassed it and has become an important metal-cleaning process since its introduction into this country about 1928.

Degreasing of steel is usually done with trichlorethylene, but sometimes perchlorethylene may be preferred because of its higher boiling point. These chlorinated hydrocarbons because of their low surface tension and high wetting power, have a high and rapid solvent action on organic materials, such as oils, fats and waxes.

The primary method consists in suspending the part to be cleaned in hot vapor over solvent that has been heated to its boiling point of 188 F. Because the part is colder than the hot vapor, solvent condenses on the metal surface and becomes liquid. As the liquid solvent flows down over the surface, it dissolves soluble oils and greases and even removes many solid particles, such as metal chips, as it drips back into the tank.

The rate of flow of the condensed solvent over the metal surfaces is not great enough to flush off all solid particles. As these particles and insoluble compounds, as limes, pigments and water-soluble soaps, are not removed, physically clean surfaces are not obtained with vapor degreasing.

But practically all oils and greases are effectively removed. Solvent vaporizing from the bottom of the tank is always clean and uncontaminated with oils and other materials that have been dissolved in the liquid solvent from preceding parts.

A second method of degreasing employs a liquid immersion to remove excessive grease, dust and dirt that a vapor phase alone could not remove. After immersion in warm liquid, parts are transferred to the vapor rinse where they come up to vapor temperature as solvent condenses on them and removes remaining oils and greases.

A still more effective liquid-vapor cycle is to immerse parts in boiling solvent in one tank compartment, transfer them to a second compartment where cooler solvent cools them from 10 to 15° and then to raise them into the vapor for a final rinse. Cooling of parts below the boiling point of the solvent is necessary to obtain condensation in the vapor rinse, because all condensation ceases when parts are at vapor temperature.

Liquid-vapor degreasing is particularly adapted to the cleaning of light-weight parts, because heat and time play so important a role. Light-gage sheet steel heats up quickly, generally before there has been sufficient condensation of solvent vapor to put all oils into solution. The result is stained work and possible changes in physical and chemical properties of the oils that may render them insoluble and unremovable even by second or third applications. Immersion in the liquid solvent, followed by vapor rinse, or use of a higher-boiling-point solvent obviates this problem.

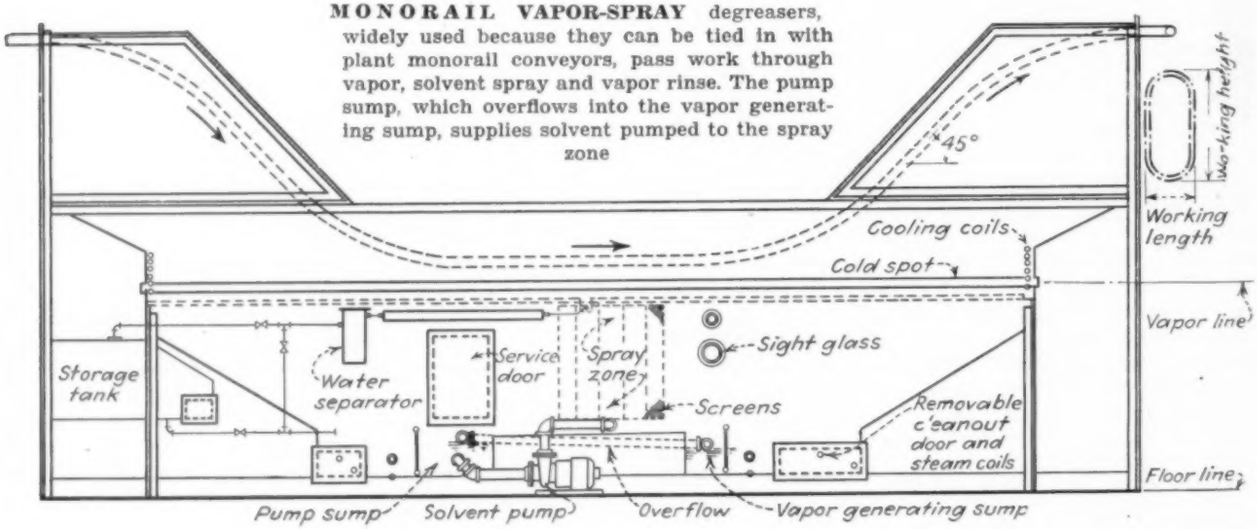
Probably the most popular degreasing method is the vapor-spray, especially for large parts for which liquid immersion is impractical or for parts that have recesses that would trap air if immersed in liquid solvent. Parts are first vapor cleaned, then sprayed with warm solvent that is cool enough to allow for a final condensation to effect a pure rinse before the metal reaches vapor temperature. Mechanical action of the spray removes more of the solid dirt particles than would the vapor phase alone.

Advantages and Disadvantages

Principal advantage of vapor degreasing, besides practically complete removal of oils and greases, is the rapid drying of parts. Because of the temperature to which they are heated and the volatility of the solvent, parts come from the degreaser so nearly dry that no stains are formed. Furthermore, the high operating temperature lowers viscosity of the oil and softens solid greases. This allows rapid penetration by the solvent and quick removal of organic materials in holes or recesses, such as rolled edges on stamped articles.

Principal disadvantage is, as already stated, that a physically clean surface is not provided. Degreasing must be followed by some other means of cleaning (usually alkaline) before electroplating or other finishing operations. As all solid dirt particles are not flushed off, removing them in a subsequent cleaning operation may be even more difficult than if oils had not been previously degreased from the metal surfaces.

Vapor degreasing is considered to be more expensive than other cleaning methods, because of vapor loss, quantity of cooling water needed



MONORAIL VAPOR-SPRAY degreasers, widely used because they can be tied in with plant monorail conveyors, pass work through vapor, solvent spray and vapor rinse. The pump sump, which overflows into the vapor generating sump, supplies solvent pumped to the spray zone

and the relatively high cost of solvent. Moreover, its very removal of practically all oils and greases may, in some cases, be a disadvantage, because steel cleaned by degreasing will rust rapidly unless promptly treated with a protective coating.

Like other hydrocarbon solvents, trichlorethylene is toxic and requires care in its use because of its narcotic effects. Inhalation of its vapors may produce nausea, dizziness, and headaches, but so far as is known there are no permanent effects on heart, liver or kidneys. Trichlorethylene, in contact with an open flame, will decompose to toxic phosgene.

Contact of the skin with vapors may produce the same effects as inhalation, while contact with liquid solvent may dry and crack the skin, and make it more susceptible to infection. High concentrations of vapors should be considered a health hazard, and exposure to them avoided.

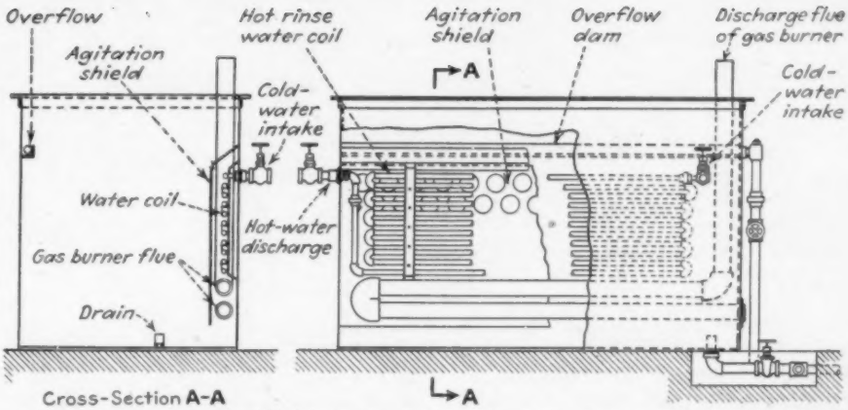
A maximum allowable concentration for an 8-hr. working day is considered by most authorities on hygiene to be 200 parts per million. Presence of vapor may be detected by a halide lamp. Concentration may be measured by decomposition of the chlorohydrocarbon and measurement of the resultant hydrogen chloride, or photoelectrically by a DuPont Tri-Per Analyzer.

Degreasing Equipment

Selection of degreasing method and equipment depends on shape, size, quantity, type and condition of parts and the nature of the dirt to be removed. Machines are built with one, two, three or occasionally even more compartments as required by the process. Operation may be manual for relatively small production or conveyorized for continuous production.

In straight-vapor, one-dip tanks, solvent is heated by steam, gas or electricity to its boiling point. Solvent vapors fill the tank to a definite vapor line at the condenser which is usually a water jacket around the tank or a series of coils inside. The distillate collects in a trough below the condenser, and passes through a water separator into a storage tank and then back to the boiling chamber. The water separator prevents formation of mixed solvent-water vapors readily lost into the air.

Liquid-liquid-vapor tanks have two or three compartments. The distillate, as in the single-tank unit, collects in a trough below the condenser and passes through a water separator. It then flows into the second, or cooler, rinse chamber, keeping this solvent quite clean, and finally overflows into the boiling chamber. For greater production, addition of a third compartment permits the vapor rinse to be made in a separate chamber rather than above the warm solvent.



ALKALINE SOAK TANK, steam heated by side coils, has an agitation shield to provide solution circulation, an overflow dam to remove dirt and oil floating on the surface and a drain nipple to prevent sludge from clogging the drain

Vapor-spray tanks are similar to straight-vapor tanks with the addition of a hose and nozzle for spraying, or slushing, the parts. Warm solvent, after it condenses off the work and passes through the water separator, is pumped from the storage chamber to the nozzle.

Conveyorized degreasers are of three general types: monorail, cross-bar and mesh belt. Combinations of vapor, liquid-vapor and vapor-spray are readily embodied in any of these designs.

The monorail vapor-spray is at present the most popular type, as it can so easily be tied in with an overhead conveyor system. Cross-bar machines readily handle trays, baskets and special fixtures, which may be loaded and unloaded manually or automatically. Ordinary flat baskets will clean the usual run of parts. For nested parts, a rotary basket in liquid-vapor cleaning should be used so all parts are thoroughly degreased and rained of solvent. Hanging of any part must be done with care to avoid dragout of liquid solvent.

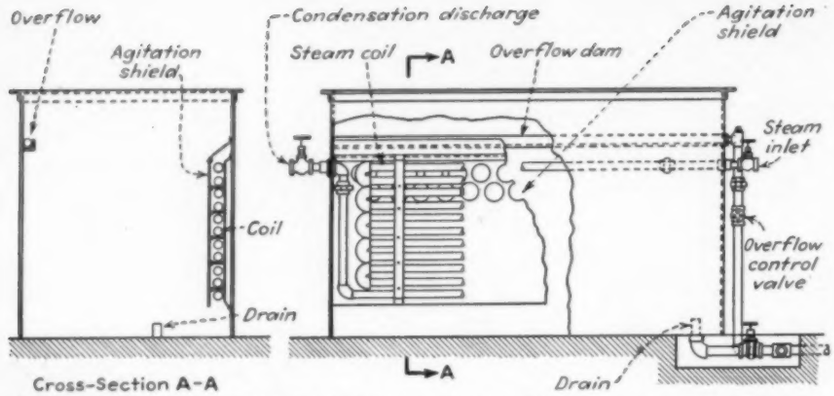
Mesh-belt vapor-spray machines are particularly adaptable to degreasing of intricate stampings. These may be placed on the belt and held by pins woven into the mesh. Small parts can also be ably cleaned, without loading them into baskets, by feeding them on the conveyor automatically or by hand.

Degreaser Operation

Whether dip or conveyor type, degreasers must be kept clean. Solvent should be distilled out as often as necessary, and the sludge cleaned from the tank. When the solvent is polluted by iron salts (and particularly by aluminum salts in cleaning aluminum parts), it becomes acidic, in the presence of water, because of decomposition into hydrochloric acid by hydrolysis. This requires either a new solution or sometimes addition of soda ash to neutralize the bath. Solvent may also decompose by oxidation from photochemical effect (actinic rays), although this is offset by addition of a stabilizer, such as a pyridine or an amine.

Although vapor from boiling solvent remains clean, because of the distinct difference in boiling points of solvent and oil, mixing of oil with solvent causes the boiling point to rise and vapor generation to decrease. Increase in boiling temperature leads to solvent decomposition, corrosion of equipment, loss in heating efficiency and decrease in unit capacity. Cleanout is suggested when the boiling point reaches about 195 F.

Another important precaution to observe in degreaser operation is not to overload a unit. Trying to run too much work through a degreaser results in improperly cleaned surfaces and solvent loss. Work withdrawn before it is up to the temperature of the solvent vapor will be coated with liquid solvent, which not only is lost but pollutes the atmosphere around the degreaser as well. Work should be left in the vapor until the condensed solvent



SPECIAL SOAK TANK, heated by an immersion-type gas burner, has a water coil inside the agitation shield for heating the rinse water which may be discharged into a dip tank or from a hand manipulated nozzle for a spray rinse

stops dripping from it at this stage.

Removing the work too fast also drags out solvent. A vertical speed of 11 fpm. is generally considered the top limit, especially for parts, the shape of which would likely cause considerable displacement of solvent vapors. Furthermore, slings and cables should be made of metal rather than of rope which would absorb and drag out solvent.

Cleaning work that is too large may have the same effect as too great a removal speed. If the work is solid so vapor cannot pass through it, clearance between work and walls is necessary to avoid vapor displacement into the air zone and consequent solvent loss. A clearance from 2 to 6 in. may be needed, depending on work contour, and should be considered in selecting basket sizes and in arranging work loads.

Other details suggested by manufacturers as possible sources of solvent loss include:

1. Losses into atmosphere from improper heat balance or improper cooling control—vapor level should be kept fairly constant, not above the mid-point of the condenser or below its bottom, even with maximum work load.

2. Drafts over the degreaser—if equipment is located in cross drafts, solvent is lost from the machine and contaminates the surrounding atmosphere.

3. Improper work handling—racks too large, poor racking that causes liquid dragout, use of wooden racks or rope slings, spraying above the vapor line, removing work too soon both from vapor and free-board area.

4. Covers off during idling.

5. Solvent loss during distillation.

6. Discarding residues containing solvent.

7. Leaks in pumps, valves and pipe connections.

8. Excessive moisture in machine—indicated by cloudy vapors as compared to transparent vapors present with correct operation.

9. Cleaning overalls or other garments that drag out solvent.

10. Losses from poor housekeeping, requiring more frequent recharging with new solvent.

EMULSIFIABLE CLEANERS

Self-emulsifying, or emulsifiable, organic solvents combine the action of a solvent and the emulsifying properties of a solvent-soluble dispersing agent or a soap in the presence of a blending agent. The hydrocarbon solvent may be kerosene, naphtha or safety solvent, the emulsifying agent—a soap such as potassium oleate, and the blending agent an organic compound such a butyl cellosolve, cresylic acid, a cyclohexanol derivative or a synthetic surface-active material.

Developed about 1930, these cleaners have been particaularly useful in pre-cleaning operation where surfaces are covered with smut or such adherent dirts as buffing compounds. On the latter, however, an emulsion dissolved in water with agitation is sometimes more effective than soaking in full-strength emulsifiable cleaner, because the cleaner may not penetrate the mixture of dirt and compound.

Applied either by tank dipping or washing-machine spraying, emulsifiable cleaners combine with oil dirts and the combination can be rinsed off readily, particularly with hot water. When parts are soaked or sprayed, the solvent carries into solution some of the organic binders of the surface dirt and brings the emulsifying agent, wetting compound and blending agent into contact with the insoluble. solid dirt particles.

The exact action from here on is not known. The commonly accepted theory is that while the hydrophobic (water-hating) end of a molecule of the emulsifying agent attaches itself firmly to oil and dirt particles, the hydrophilic (water-loving) end permits the dirt to be emulsified when the work is rinsed with water. It is also known, or accepted, that electrical charges on dirt particles, metal surface and colloidal ingredients affect the cleaning action.

The time in which parts are dipped in or sprayed with emulsifiable cleaners depends on condition of surfaces. If the work is only oily, a short immerison of 10 sec. to 1 min. may be sufficient, while buffing compound may require 5 to 15 min. and agitation of the bath for good cleaning.

After a brief drain, parts are rinsed, preferably in a hot-water spray to remove all residues. The parts leave the rinse with only a slight film of solvent on their surfaces. This film must be removed by alkaline cleaning before electroplating, but does not interfere with

STEAM COIL LENGTHS*

(To Heat 1 Gal. of Water from 60 to 210 F. in 1 Hr.)

PIPE DIA IN IN.	STEAM PRESSURE IN LB. PER SQ. IN. 3	10	25	50	100	150
	FT. OF PIPE PER GAL.					
½	0.92	0.50	0.36	0.27	0.20	0.16
¾	0.69	0.38	0.28	0.21	0.15	0.12
1	0.54	0.30	0.22	0.16	0.12	0.10
¼	0.42	0.23	0.17	0.12	0.09	0.08
1½	0.36	0.19	0.14	0.11	0.08	0.06
2	0.28	0.15	0.11	0.08	0.06	0.05
2½	0.23	0.13	0.09	0.07	0.05	0.04

* *These values are greater than theoretical values by an allowance that compensates for dirty pipes. To calculate coil lengths for heating solutions in ½ hr., use twice the lengths for 1 hr.*

painting, lacquering, blackening or phosphate treatments.

Principal advantage of emulsifiable cleaners is their removal of dirts that are not affected by alkaline cleaning or vapor degreasing. In effect, an emulsifiable combines desirable cleaning features of both methods. It is used at room temperature (70 to 90 F.), is non-explosive and has no harmful effect on metallic surfaces. It is extremely effective for removing stubborn pigmented drawing compounds, as well as buffing and polishing compounds and slushing oils. If any is carried over into an alkaline cleaner, it will, it is claimed, improve the cleaning power of the alkaline bath.

Disadvantages are few. It is slightly toxic and may affect workers' hands. It is not good on wet parts, and dragout cost may be high if parts cannot drain well. Nesting of parts should be avoided and provision should be made to rinse thoroughly all surfaces and crevices of the work to prevent carryover and decomposition in acid dip and oil carryover to the plating bath.

ALKALINE CLEANERS

Oldest of commercial cleaners, and still by far the most widely used, are the alkaline cleaners. Dating from many years ago, when potash was the sole alkaline cleaner, they have become highly specialized cleaners, based on sodium salts used either singly or in mixtures as detergents.

Various combinations include the older types, such as caustic soda, trisodium phosphate and soda ash, and the newer salts, such as the soluble sodium silicates. Present-day cleaners obtain their required alkalinity by salts that are less dangerous to handle than the caustics. But as heavy-duty cleaners must necessarily have a high alkalinity, they should nonetheless be handled with respect and care if one is to avoid burns.

In case of hard water, water-softening agents are added, among them being sodium carbonates and phosphates. Phosphates, such as trisodium phosphate, are more expensive than carbonates, but form flocculent calcium or magnesium phosphates that are free-rinsing. Certain types of polyphosphates are claimed to have a still more remarkable softening action, both by combining with the calcium so it cannot react with the soap and by decomposing calcium soaps already formed.

But an alkaline salt alone cannot serve as a cleaner for the widely diversified dirts encountered in process cleaning. First there is needed a so-called wetting agent that will bring the solution into intimate contact with the dirty surface and assist in displacing the dirt from the metal surface.

Action of the wetting agent is to lower the surface tension of the solution from about 73 to 75 dynes per centimeter to approximately 30 to 40 dynes. As the surface tension of oil is about 35 dynes, the solution can then "wet" or mix with the oil, that is, emulsify it and assist in its removal.

The emulsification of oil should be distinguished from saponification. Animal and vegetable oils are saponifiable; that is, they react with an alkali to form soap. But mineral oils do not react with the alkali to form a soluble soap. Addition of the wetting agent, by reducing the interfacial tension between cleaning solution and oil, makes possible the emulsification of the oil and eventually each oil drop is surrounded by a soap film to form the emulsion.

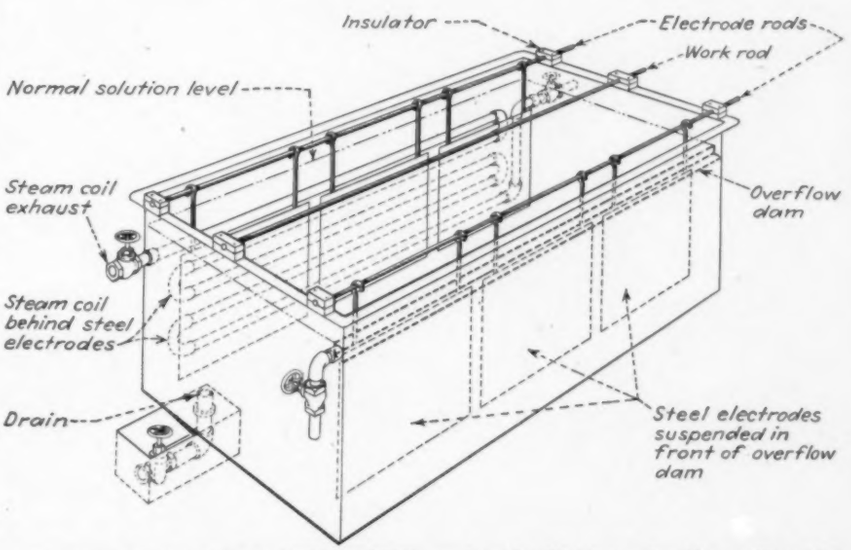
Some authorities believe, probably correctly, that emulsification and saponification play very little part in metal cleaning and that oil is removed by displacement. In fact, good alkali detergents for cleaning metals usually have poor emulsifying power.

Soap is a well-known wetting agent, but its disadvantages are that it is difficult to rinse and it is precipitated by the calcium and magnesium salts present in hard water. This would show as an insoluble scum in the alkaline tank. To avoid this difficulty, water softeners are added and wetting agents have been developed that are not so adversely affected by hard water. These synthetic wetting agents are complex organic compounds of many types, including sodium salts of saturated hydrocarbons, sulphated petroleum derivatives, sulphated fatty acids, sulphated naphthalene, sulphosuccinin acid ester, alkyl aryl sulphonate, isopropyl naphthalene sulphonic acid and others.

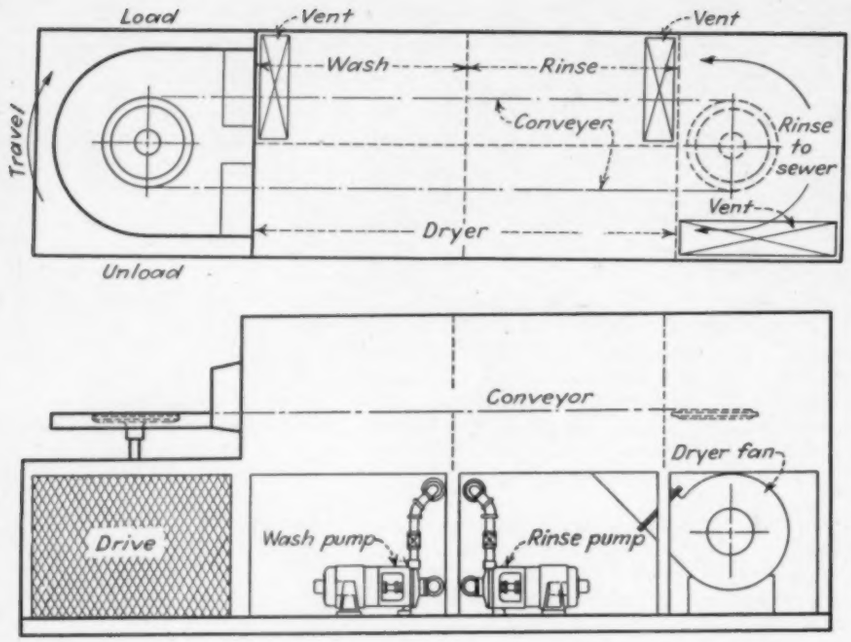
Value of a cleaning solution, as far as its alkalinity is concerned, is largely determined by its active sodium-oxide content, as indicated by titration with a standard acid to a phenolphthalein end point. Alkalinity and the active sodium-oxide content are closely related, because the greater the active sodium oxide the higher will be the pH, which for steel cleaning should be held above 11.

When the pH of a soap-containing solution is reduced, its detergent properties are correspondingly reduced until it loses its wetting power. To prevent this condition, cleaners are "buffered" by adding an excess of certain alkalis. Properly buffered solutions will maintain a constant pH.

But dirt and work generally consists also of solid particles in addition to oils and greases. While the latter are removed by displacement,



ELECTROLYTIC CLEANING TANK, equipped with steam heating coils and overflow dam, has sheet steel electrodes hanging from electrode rods in front of coils and dam. Electrodes should have top edges about 3 in. below normal solution level and porcelain insulators at bottom edges to prevent contact with tank sides



RETURN-TYPE WASHERS may be made with either monorail or flat conveyor. This horizontal return washing, rinsing and drying machine is loaded and unloaded at one end and has been successful for cleaning lenses, electric shaver heads, silverware and small tubes

should be preceded by soak cleaning or mechanical washing to remove heavy accumulations of dirt and so lengthen the life of the electrocleaning solution. Cost of electrocleaning is appreciably affected by precleaning, as well as by the amount of work and availability of adequate generator capacity.

Mechanical Washers

Mechanical metal-parts washing machines, using alkaline, emulsifiable or solvent cleaners, are well adapted to those applications involving a large volume of work that will justify cost of equipment and operation. Design of these machines vary according to type of cleaner, size and quantity of parts, method of work handling and the number of operations to be carried on in the machine. Not only are these machines built as washers, but they may also include rinsing, drying and cooling facilities in various combinations.

Washer cleaning is generally not expected to give as clean a surface as does tank cleaning. As time of exposure to cleaner is shorter than in immersion cleaning, temperature lower, solution concentration considerably less and it is difficult to spray all surfaces of metal parts evenly, either soak or electrolytic cleaning gives better results.

But mechanical washing does remove *quickly* the greater part of oil and other dirts, particularly the stubborn buffing compound residues. It prepares work for further operations in the production line, for succeeding cleaning operations or for finishes that do not demand removal of oxides as in electroplating. Washers are especially useful for preparing parts prior to organic finishes, inspection or assembly.

Fast cleaning in a washer is made possible by a combination of mechanical and chemical actions. In spray washing, the most common method, the force of the spray against the work gives a scrubbing action that aids in removing chips, dirt and other solids. Its cutting action speeds up emulsification and is extremely effective in areas that, in soak cleaning, might act as traps for cleaning solution.

Spray action is afforded, with the solution under pump pressure, by nozzles located, usually on all four sides, in the spray zone of the washer. Their size, quantity and location must be selected to deliver solution to all parts of the work. Each nozzle must be so positioned as to give proper cutting and stripping action at its design pressure and volume. Shape of the nozzle itself depends on work surfaces, flat sprays being used for outside surfaces and round sprays for recesses.

Work movements through the spray zone of the machine may be intermittent or continuous. The latter method utilizes monorail, slat, belt or roller conveyor to carry the work either loose or in baskets, depending on size and shape. Selection of the machine conveyor should depend, to a large extent, on the existing materials-handling layout to eliminate rehandling of the work.

Most widely used machine conveyors are the mesh belt and overhead monorail. On the former, work pieces may be carried on the belt or in fixtures, while monorail conveyors carry work through cleaning on racks. Both types can be readily arranged for straight-line production.

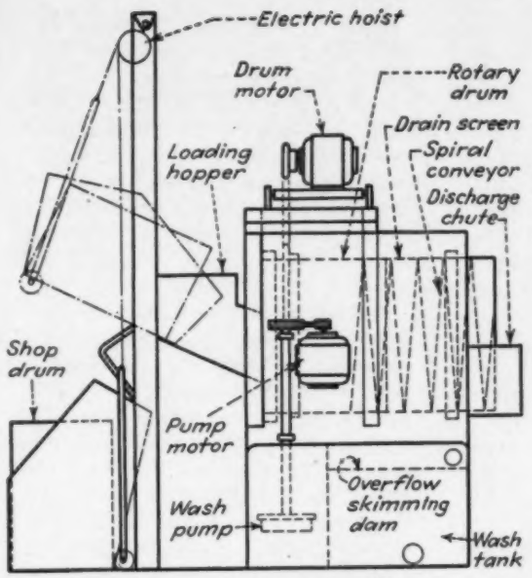
When parts must be loaded and unloaded at one end, a monorail conveyor is most adaptable. Another type, less widely used, is the rotating-platform machine wherein the platform is divided into several sections by vertical partitions. Spray washing, rinsing and drying equipment are located around the platform which carries the work past them. While this may seem an ideal arrangement, operating difficulties, such as leakage, preclude wider application.

For many cleaning problems, especially on small work, machines of standard design and size can be adapted. But other jobs may require a washing machine engineered for the specific application.

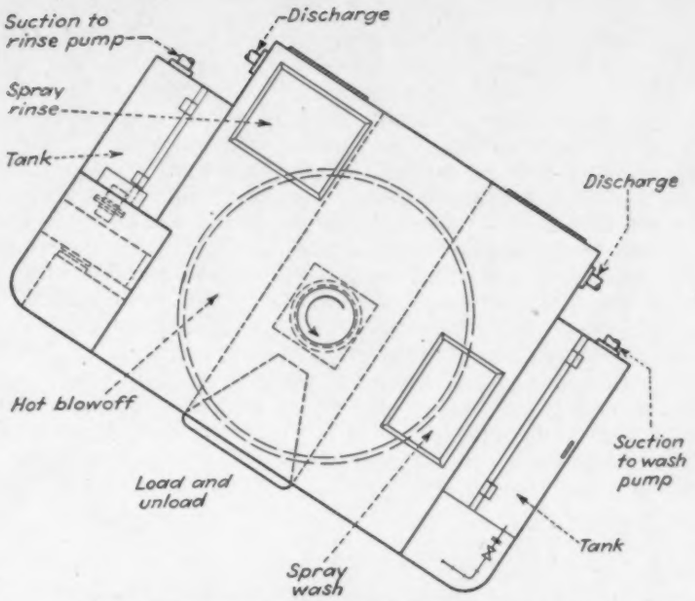
Alkaline cleaners, intended for spray washing, should be non-foaming to avoid overflow under agitation of pumping and spraying. Moreover insoluble compounds are undesirable, as these may cake on conveyor parts and clog nozzles. Other requirements of these cleaners are free rinsing, water softening, buffering action and minimum soap and wetting-agent concentrations.

Cleaner concentration in a spray washer can be lower because of mechanical action. From ⅛ to 2 oz. per gal. is sufficient as compared to 2 to 8 oz. per gal. for tank cleaning. Higher concentrations would increase cleaning efficiency, but cause excessive foaming.

A type of machine that depends on quantity of solution rather than pressure for its mechanical action is known as a splash washer. As work is carried along a conveyor within the machine, a large volume of cleaner is thrown over the parts by a paddle wheel. The force of the large volume of solution knocks off chips and other solid particles of dirt and can even penetrate batches of small parts held in baskets. These washers may be arranged with multiple stages for rinsing and drying.



BATCH ROTARY-DRUM WASHER has a cylindrical drum with an interior spiral conveyor to carry work through the drum. The work is loaded in batches, cleaned while the drum rotates in one direction and finally discharged by reversing direction of drum rotation



ROTATING-PLATFORM WASHER has a circular table that rotates slowly to carry work past washing and rinsing spray nozzles and through a drying section. This type machine has been used extensively in the aircraft industry for washing cylinders, cylinder barrels, rods, gears, pistons and other parts

In spash washing machines, approximately the same cleaner concentrations are needed as in spray washing. The agitation provided by the paddles and splash of the cleaner flowing over the work prohibits use of high concentrations because of possible foaming.

A third type of washing machine is the rotary-drum, or spiral, washer. Work parts are hopper fed in batches or in a continuous flow from an auxiliary conveyor into the rotary drum arranged as an inside spiral conveyor. As the drum turns at 3 to 6 rpm., the parts are tumbled and fed along in the direction of the spiral (actually a helix).

As parts are carried through the drum, they are sprayed from nozzles located inside or around the drum. Carried on into a drainage zone, they drain well as they are continually tumbled and then dry from their own heat, depending on size. Parts may then be discharged or the spiral conveyor extended to carry them through additional stages and operations.

Instead of using spray nozzles, a rotary-drum washer may carry parts through a soak solution and spray rinse. Another type is arranged with a scoop that picks up cleaning solution as the drum rotates and discharges it over the work through perforations.

As the first part of the drum is solid, spray from the scoop fills the sections between conveyor flights with hot solution. This tumbling action below the surface of the solution cleans all surfaces thoroughly. The solution drains out as soon as it reaches the drainage area, where the outside surface of the drum is perforated.

Work parts are discharged after draining or are carried on through other stages, as rinsing, rustproofing or pickling. Scoop spiral machines are adaptable to pickling, but the pickling section would be made of acid-resistant material, such as stainless steel.

ACID PICKLING

Pickling is the chemical removal of iron oxides from the surfaces of iron and steel parts by dipping in an acid solution.

Some years ago, pickling was largely confined to rolling-mill operations for descaling semifinished sheet and rod. But its use has so broadened in the metal-fabrication field that it is now an established process increasingly adapted into finishing techniques.

The surface required by electroplating and similar finishing operations must be free of all oxides. Preparation of such a surface requires an acid dip, after alkaline cleaning and prior to plating. Whenever steel is heated to temperatures required for hot working or heat treating, its surface is rapidly oxidized to form a blue-black "mill scale." Even annealing temperatures cause formation of scale. Moreover, even when parts are not heated, oxides may still exist on the surface from common rusting.

Physical characteristics of these oxides are so different from those of the steel that they must be removed prior to electroplating, enameling, lacquering, japanning, galvanizing, tinning, black-oxide finishing and similar finishing operations. Removal of these oxides also facilitates operations. After heat-treating, cutting-tool life can be appreciably increased if parts are descaled before machining.

Descaling also saves time and reduces cost before grinding or lapping operations. Grinding wheels on scale-free surfaces will load less and cut more freely, and there is less danger of surface checking caused by localized overheating from grinding off scale. Lapping can naturally be done quicker and cheaper if no scale is to be removed and there is less wear and tear on the laps.

Pickling Solutions

The two most common types of pickling solutions are based on sulphuric and hydrochloric acids, although nitric and hydrofluoric acids are used for some applications.

Sulphuric acid, which removes scale by attacking the base metal under the scale and so loosening it, is used in concentrations from about 6 to 15%. This solution is used hot,

from 140 to 180 F., to maintain a rapid pickling rate. Solution concentration and temperature depend, to a large extent, on the kind of steel being pickled. The foregoing values are common for mild steel. Alloy and high-carbon steels, however, are more subject to attack during pickling from an electrolytic action between steel and scale, and are usually pickled at lower temperatures.

For each job, concentration and temperature must be balanced to pickle as fast as possible, yet with minimum fuming and danger of pitting, overpickling and hydrogen embrittlement.

Concentrations of hydrochloric-acid solutions run from 5 to 50% of 18 to 20° Bé acid. These are generally used at room temperature to avoid fumes and loss of the volatile hydrogen chloride. While hydrochloric acid is more effective in removing scale because scale is more soluble in it than in sulphuric acid, hydrochloric acid costs and fumes more. Its higher cost particularly causes it to be used less than sulphuric acid. But its fast action makes it especially preferable for removal of light oxide films formed on polished steels.

Another disadvantage of hydrochloric acid is the added handling trouble. It requires the more expensive rubber, brick or organic-lined tanks and special coils or sheathing (carbon, silica or tantalum), as compared to lead-lined tanks and lead steam coils or lead sheathing for sulphuric acid.

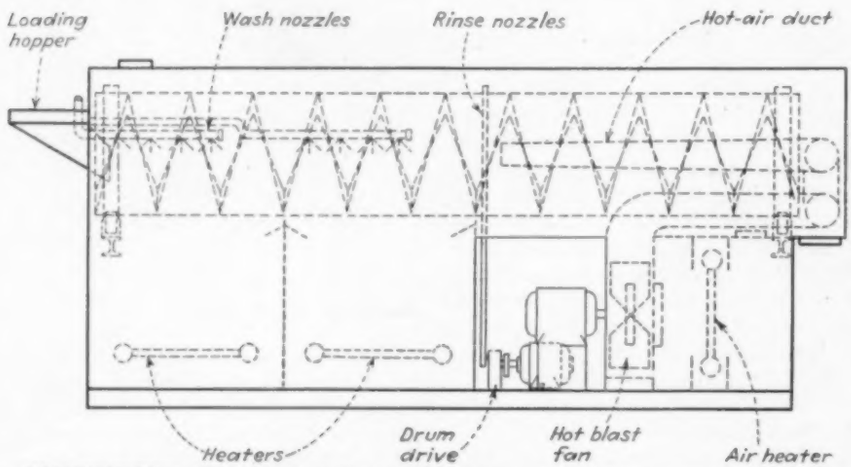
Advantages of both acids may be obtained by adding sodium chloride to a sulphuric-acid solution. The salt combines with the acid to form a low percentage of hydrochloric acid.

Nitric-acid solutions are far less common than sulphuric- or hydrochloric-acid baths, being adapted particularly for pickling stainless steel and other corrosion-resistant steels. Concentrations generally vary from about 10 to 25%, although up to 50% concentrations are used. Typical solutions are 15 to 25% nitric acid plus 2 to 10% sodium chloride for stainless steel, and 25% nitric acid plus 2% hydrofluoric acid for corrosion-resistant steel. Hydrofluoric acid is added to accelerate the pickling action in the latter bath which operates at room temperature.

No standard concentrations, temperatures or pickling procedures can be set up for any of these solutions. The kind of steel, the preceding operations, and the kind of thickness of the scales determine solutions and procedures.

Pickling-Solution Inhibitors

When steel is immersed in a sulphuric-acid bath, two reactions take place. First, the acid reacts slightly with the oxide scale to form iron sulphates and water. Second, the acid combines with iron to form iron sulphate and hydrogen gas. To retard acid attack on steel that has been descaled without reducing its attack on the scale or on the base metal under the scale, organic materials, known as inhibitors, are added to the bath. Among such materials are aliphatic and aromatic amines, and pyridine and quinoline derivatives.



CONTINUOUS ROTARY-DRUM MACHINE is arranged with constant spiral feed through spray washing, rinsing and drying stages. The drum, supported on rollers, receives work at one end and discharges it at the other after passing it through as many stages as desired. This machine is especially useful for cleaning small screw-machine or stamped parts and can be adapted to pickling operations

Their action seems to result from an absorption layer deposited on the clean steel surface. This layer retards acid action on the descaled metal but not on the scaly area. As the layer deposits most heavily where the metal tends to go into solution most readily, the descaled steel surface is protected while the acid attack on the scaly area is little affected.

Besides retarding acid attack on the base metal, the inhibitor saves acid and reduces sulphate build-up, surface pitting, fuming, and overpickling. As it reduces the evolution of hydrogen gas, some authorities believe there is less tendency for occlusion of hydrogen into the base metal and the resulting hydrogen embrittlement, also called acid brittleness. Other authorities believe that most inhibitors do not prevent hydrogen embrittlement, claiming that hydrogen is absorbed interstitially and the amount of evolved gas has no bearing on the amount absorbed.

One disadvantage in the use of an inhibitor is that the film deposited on the work should be removed before electroplating, vitreous enameling, phosphate coating and similar operations. The film is not easily rinsed off. To remove it effectively requires an alkaline or strong uninhibited acid dip or a high-pressure hot-water rinse.

Controlling Pickling Baths

As steel is pickled, the acid concentration of the solution decreases as the iron-sulphate content builds up. When the iron content increases, action of a sulphuric-acid bath decreases to such an extent that an 8% iron content reduces pickling action by about 50%.

While the iron content is low, acid additions may be made frequently and in small amounts to restore the bath. When the iron content reaches from 5 to 6%, further acid additions have slight effect so, at this point, the bath is usually discarded, or the operating temperature is raised to use remaining acid and the bath then discarded.

Hydrochloric-acid solutions, however, become more active as the iron-chloride content increases. But as iron salts are hard to rinse from the work, these baths too are generally discarded when the iron content rises above 5%.

Measurements of acid and iron concentrations are made by titration, the first with a standard alkali solution and a methyl-orange indicator

and the second with a standard potassium-permanganate solution.

Neutralizing Pickled Parts

When steel parts are removed from a pickling bath, all traces of acid and iron salts must be removed from their surfaces to prevent rusting. Removal of all traces of acid is difficult by water rinsing alone, so an alkaline rinse is recommended to neutralize any remaining acid.

Neutralizing baths are of various compositions. A successful one consists of 75% soda ash and 25% borax with an active sodium-oxide content of 0.25 to 0.3% and an operating temperature of about 160 F. This is followed by a borax dip at 170 F. with a sodium-oxide content of about 0.08%. Another bath giving good results consists of sodium cyanide (0.2 oz. per gal.) with enough caustic soda to give an active sodium-oxide content of 0.3%. Operating temperature is from 120 to 130 F. Ventilation with a cyanide bath must be good.

Good neutralizers not only provide rust protection but also avoid smut, streaks and stains. They should be free-rinsing. An excess of iron salts in the neutralizing tanks must be avoided to prevent deposition of salts on parts. Determination of the iron-salt content is made by titration.

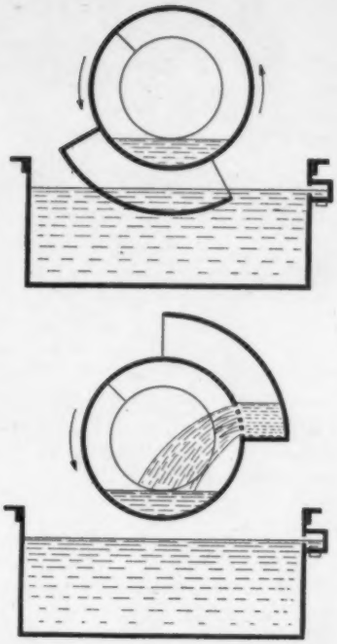
Electrolytic Pickling

Just as alkaline soak cleaning can be speeded up by use of electric current, so can pickling action be accelerated and descaling time reduced. Electrolytic pickling is especially adapted to rapid removal of black magnetic iron oxide, Fe_3O_4, which in a still pickling solution is difficult to remove.

The process is carried on, usually in a sulphuric-acid solution, by making the work the cathode. Procedure and solutions vary according to the process employed.

The Bullard-Dunn process uses a 10% acid solution containing a small quantity of tin (or zinc) and an additive to reduce surface tension and improve the throwing power of the bath. The work is made the cathode, while anodes are of high-silicon iron except one or two that are made of tin to furnish the tin content to the solution. The bath is held at 140 to 150 F. with a current density of about 60 amps. per sq. ft. Current density of this value is generally obtainable at 4 to 6 volts for racked work and 6 to 9 volts for barrel work.

When the scale and rust are removed from work surfaces by combined action of acid and gas evolved from electrolysis, a thin, continuous film of tin is plated on the cleaned base metal. This layer of tin protects the steel surfaces from pitting and etching. It is claimed that the process will not attack the work, regardless of the length of treatment time, and that no dimensional changes occur.



SCOOP ROTARY-DRUM WASHER has a spiral scoop that picks up cleaning solution as the drum rotates and sprays it over the work through perforations in its bottom. The drum shown here is solid and carries the solution along with the parts

The tin content of the bath, besides plating out on the work, improves the throwing power of the solution and enables it to remove scales and oxides from recesses and holes. This is of special advantage in cleaning intricate parts. The excellent throwing power imparted by the tin is attributed to the high hydrogen over-voltage of tin, causing the current to be directed to areas covered with scale and not yet filmed with tin.

When steel parts are to be electroplated, phosphate coated, blackened or similarly finished, the tin film must be removed before applying any of these coatings. This is done in an alkaline electrolytic cleaning bath in a ½- to 1-min. treatment, with the work made the anode.

Hot dipping, painting, soldering and such operations do not require defilming. Painting and lacquering over the tin film, for example, gives better corrosion resistance than over the base metal. The tin film also protects the surface of the base metal between processes and, in the case of parts to be soldered, adds additional protection against acid fluxes and aids in good wetting by the hot solder. If machining operations are performed after pickling, the tin film is not objectionable and, in drawing, is actually an advantage because of its lubricating action.

Another electrolytic-pickling process is the Hanson-Van Winkle-Munning bright dip. This is carried out in two steps—the first dip with the work the cathode and the second dip with the work the anode. The result is quicker pickling and much less attack on the metal than in still pickling.

The first solution is 10 to 20% sulphuric acid in which the scale is removed, but parts are coated with a smut—"acid black." This is removed in the second bath, 40 to 50% sulphuric acid. Current densities in both baths are kept high, from 100 to 150 amps. per sq. ft., and solution temperatures low, up to about 90 F. If temperatures are too high and current densities too low, workpieces may come from the bath clean but not bright.

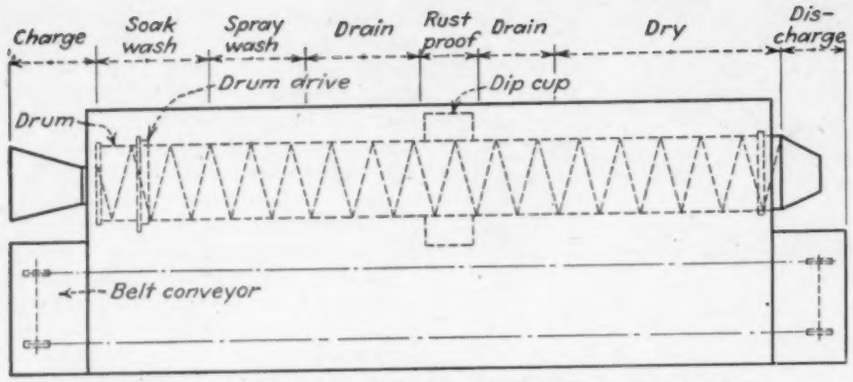
Principal advantages of these two processes, as well as of other proprietary electrolytic-pickling processes, are speed of treatment, saving in acid and base metal, and reduction in etching and hydrogen embrittlement.

Average electrolytic-pickling time is about 1/5 to 1/6 that required for still pickling. This time saving means less acid used and less metal consumed by the acid. Estimates on acid saving vary considerably, but consensus is that consumption is about 50% less than for still pickling. These savings may offset the greater cost of carrying on electrolytic pickling.

Equipment is more expensive and power cost is an appreciable item. Moreover, some processes specify high sulphuric-acid concentrations—as great as 85%. Acid dragout with these concentrations can be a costly item.

Pickling Equipment

Various degrees of mechanization can be applied to pickling operations. Simplest of equipment is the ordinary dip tank made of wood, steel, Monel metal, masonry or concrete. These are used with a variety of linings—rubber, lead or the newer synthetics. Both tank and lining material depend on the acid, its concentration, bath temperature



COMBINATION DRUM AND CONVEYOR WASHER, equipped with one or more stages, is of use in shops having a variety of work—some small that should be washed in a drum and some of a size and shape that require belt-conveyor handling. The combination machine needs less floor space than would two separate machines

and the character of the service.

Tank leakage has always been a nuisance, not only wasting acid but damaging floors and creating poor working conditions as well. New materials are being constantly introduced, so an installation recommended today might not be recommended a year or even 6 mo. from now. But even so, one thing should be emphasized—the first cost is of little consequence. A plant that buys the best of equipment can save its cost in a short time by eliminating acid leakage and increasing operating efficiency.

Pickling lends itself well to conveyorizing. Hot pickling of steel parts can readily be done in rotary drum machines, similar to or identical with spiral metal-parts washers. An interior spiral conveyor carries parts through the pickling solution. These machines can be arranged with additional stations. Parts, for example, that are annealed between drawing operations can be pickled, rinsed, neutralized, soaped and dried to prepare them for the next draw.

Another pickling conveyor, also employed in other prefinishing and finishing processes, is a rotary-arm machine that can be arranged with from 5 to 20 stations, depending on the number of process sequences. It can be controlled by push-button or automatically by an adjustable timing unit. Single or dual timing permits leaving the work at each station the same length of time or conveying it through the cyle on alternate periods. Dual timing is of value where rinse times can be cut down. Work agitation can also be built into such a machine with the work held on racks or hooks or in baskets or rotating barrels.

Layout of a fully automatic cleaning and pickling machine is shown in an accompanying illustration. It is of the intermittent-movement, lift-arm type for transferring work racks from tank to tank. Period of movement in this machine is 25 sec. and rest period is 15 sec., with a production of 90 arms per hr.

Parts delivered to this particular machine have been stamped and immediately spray-washed with an emulsifiable cleaner so the drawing compounds have no chance to set. Additional processing is to be done prior to enameling the stampings for stoves, sinks and bath tubs.

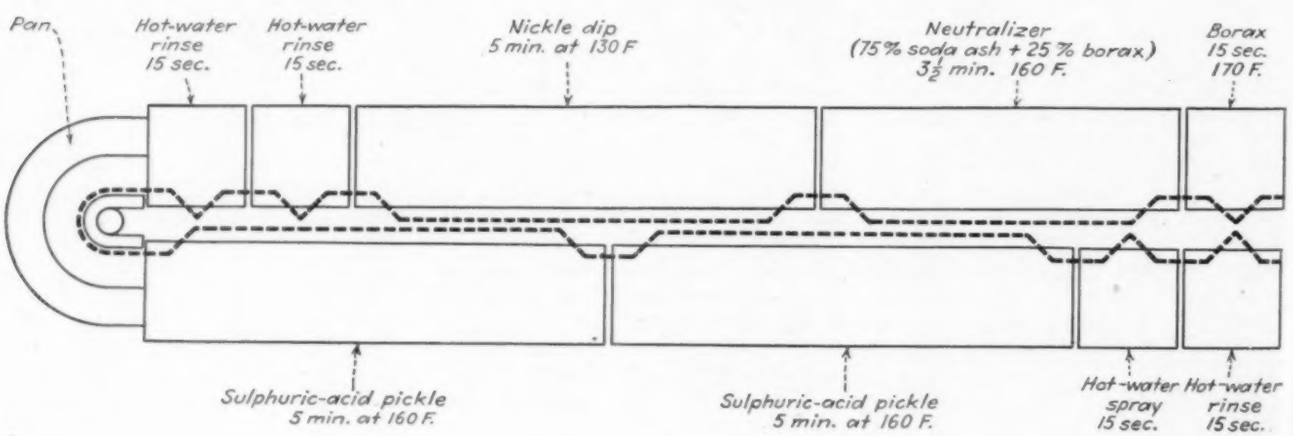
Parts are loaded on the carrier arms at the loading and unloading station and immersed in the first of two alkaline soak tanks. In the first of two alkaline tanks, heavy cleaning is done with a 6-oz. per gal. solution for 6 min. at 212 F. The cleaner in the second tank is also held at 212 F. but only a 3-oz. per gal. concentration with a 5-min. cleaning period.

After two hot-water (120 F.) rinses for 15 sec. each, parts are conveyed through two pickle tanks. Solutions are 6 to 7% sulphuric acid and are held at 160 to 165 F. Treatment time is 5 min. in each tank. Pickling is followed by draining and two hot-water rinses, again for 15 sec. each. Rinsing periods are usually longer than this, but satisfactory rinsing is being done with the two short rinses.

To improve adherence of the ground coat and to reduce fish scale and copper head difficulties, parts are given a nickel dip for 5 min. at 130 F. The dip is held at about 130 F. and 3.5 to 4.0 pH, and is made up of a 0.5-oz. per gal. solution of single nickel salts. This solution should be controlled carefully to give good results and should be renewed when iron-hydroxide sludge accumulates and affects rinsing qualities.

The nickel dip is followed by neutralizing for 3½ min. at 160 F. in a 75% soda ash and 25% borax bath having an active sodium-oxide content of 0.25 to 0.3%. Parts are next borax-dipped for 15 sec. at 170 F.,

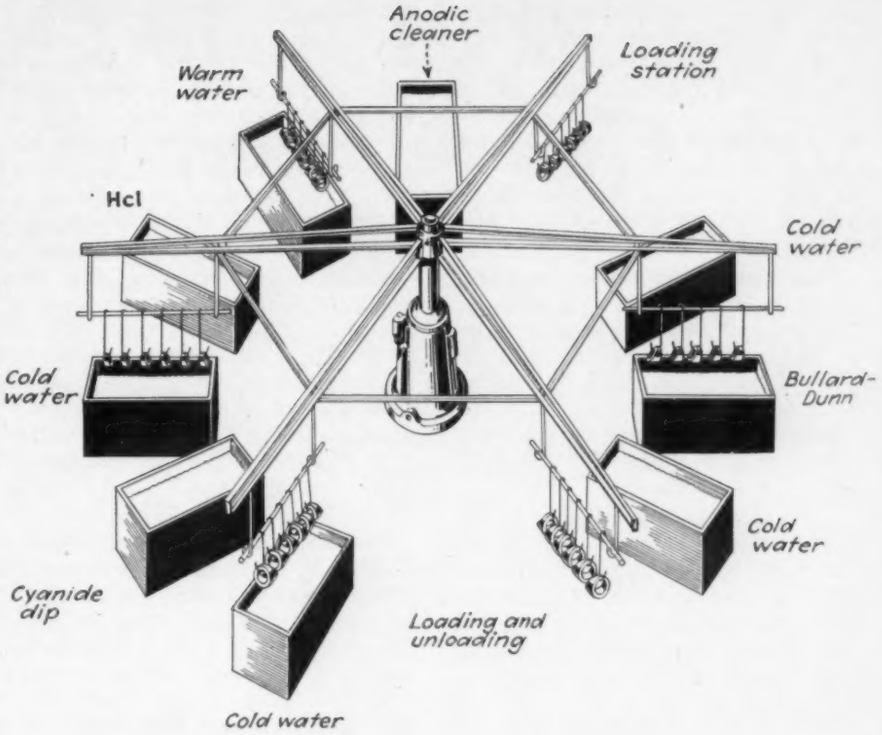
AUTOMATIC CLEANING AND PICKLING MACHINE, 146 ft. long and 17½ ft. wide, is of the intermittent-movement, lift-arm type that transfers racked work through cleaning, pickling, nickel dip, neutralizing and drying to prepare it for subsequent enameling. Tanks are hooded as much as possible to reduce contamination of surrounding atmosphere


Pan
Hot-water rinse 15 sec.
Hot-water rinse 15 sec.
Nickle dip 5 min. at 130 F
Neutralizer (75% soda ash + 25% borax) 3½ min. 160 F.
Borax 15 sec. 170 F.
Sulphuric-acid pickle 5 min. at 160 F.
Sulphuric-acid pickle 5 min. at 160 F.
Hot-water spray 15 sec.
Hot-water rinse 15 sec.

the bath having an active sodium-oxide content of 0.08%, and then dried for 5 min. in a gas-fired dryer. All other heating is done by steam coil.

The foregoing procedure should not be considered standard. It works for the job in question. For instance, the two rinses following alkaline cleaning might be changed, with satisfactory results on many jobs, to a hot-water rinse at about 175 F., followed by a cold-water rinse. Moreover, the nickel dip may be of the double-nickel type with additions of borax and ammonium carbonate to give a pH of about 5.5 and operated at a higher temperature, from 160 to 195 F.

Variations in shop conditions, opinion and even the water will influence the procedure. But one thing is certain, regardless of what the procedure may be: predicting the cleaning and pickling operations on what might work instead of on an analysis of preceding operations and the compounds used in them invites failure every time. Incomplete co-operation between press room and cleaning department pays off in oil films that prevent the enamel from wetting the surface of the steel, bare spots, copper heads and maximum cleaning trouble in removing fabricating compounds, especially those containing insoluble pigments.



ROTARY-ARM, STATION-TYPE MACHINE automatically conveys work through cleaning and pickling prior to electroplating of these aircraft engine parts. These machines can be adapted to many types of finishing operations with up to 20 processing stages

DIP AND SPRAY RINSING

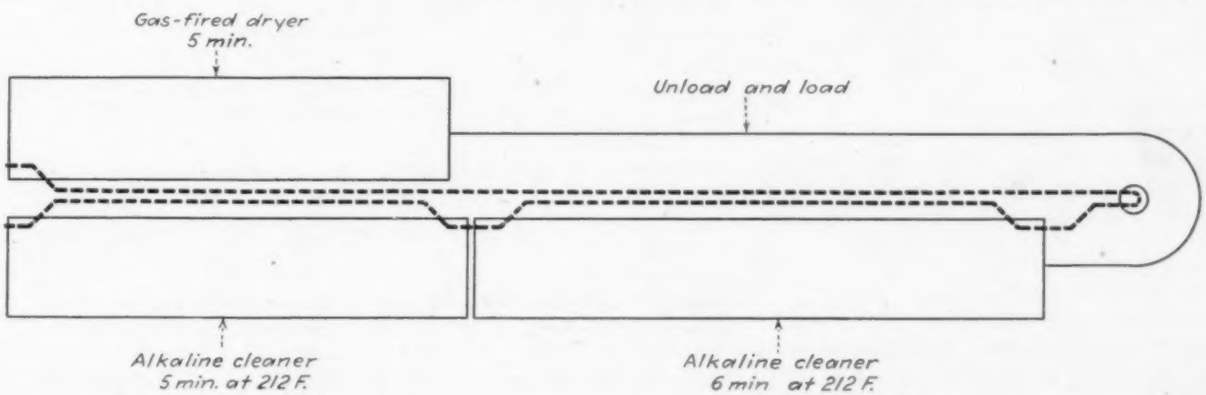
So far in this report, rinsing has been casually mentioned as an operation required between and after cleaning processes. But it cannot be so lightly regarded if cleaning is to be successful and if subsequent solutions are to remain uncontaminated. When something goes wrong in a cleaning setup, almost invariably the cleaning solutions first are blamed rather than the rinsing where at least half the troubles may develop—and do.

A reputable manufacturer of cleaning compounds and machines expresses it this way: "Many volumes have been written concerning the virtues of one plating solution and procedure as compared with another. Likewise, adjectives have been terribly overworked in extolling the merits of certain cleaners, but rinsing has been hidden as the proverbial family skeleton. Perhaps if someone invented a solution for the rinse tank other than water, then the rinse would become a major topic.

Rinsing, by dilution and removal of an adhering solution, avoids carry-over of solution into succeeding ones. It is easy to imagine what would happen to a plating bath, for instance, if no rinsing, or exceptionally poor rinsing, were done. Solution carryover and resulting contamination would soon produce an inoperating bath of alkali, acid, dirt and plating salts.

Thoroughness of rinse, therefore, determines efficiencies of succeeding solutions. Granted that perfect rinsing is impossible because water-soluble material cannot all be removed by dilution, rinsing operations can still be made thorough and complete enough for all practical purposes.

To realize the importance of rinsing, it is necessary to consider what actually happens when improper



rinsing causes solution to be carried over by workpieces. When work comes from an alkaline cleaner, it is coated with a film of cleaner that also contains emulsified oil or grease removed from the work. Recesses and holes in workpieces also encourage carryover by entrapping cleaner solution (even when rinsing is fair).

Introducing alkali into an acid dip partially neutralizes and weakens the acid solution and lowers its activity by raising its inactive salt content. Furthermore, the oil carried over into the cleaner builds up in the acid tank. Work coming from the acid dip would then show a water-break surface.

This also could happen if the original dirt were a saponifiable grease. Although no oil might be carried into the acid tank, the cleaner carried over would contain a considerable amount of soap. The acid would then break down the soap into the fatty acids or greases from which it was originally formed. Grease deposited on the work would again cause a water-break surface. But good rinsing between cleaner and acid dip would remove these emulsified oils and soaps that otherwise would contaminate the acid solution.

How to Avoid Carryover

Good rinsing, either dip or spray, is the answer to many cleaning setup problems. Most common is the overflowing dip tank. Although cheaper in construction than a spray rinse, a dip rinse uses more water and is slower. The water in a dip tank must overflow continually, even to be partially free of contamination from previously used solutions.

In dip-tank rinsing, drainage of cleaner from the work is a requirement to avoid excessive contamination of the rinse. Immediate transfer from cleaning solution to rinse tank builds up contamination quickly; it is estimated that immediate transfer causes a carryover three times that with a drainage period of 5 sec. Poor drainage along the whole line contaminates not only rinses but all subsequent solutions as well.

But transfer from cleaner tank to rinse should be rapid enough to prevent work from drying. This may happen, with high cleaning-solution temperatures and concentrations, even before the cleaner properly drains from the work, causing spots and stains on work surfaces and high carryover into the rinse tank.

In one conveyorized bonderizing installation, in which the cycle between tanks was approximately 28 sec. and could not be reduced because of conveyor speed, this trouble was eliminated by water sprays between tanks. Sprays were installed between oxalic-acid and bonderizing dips and their subsequent cold-water rinses to wet the parts as they passed from solution to rinses.

Agitation of rinse water is a decided help in speeding up rinsing and providing a better rinse. It may be done in several ways—blowing in compressed air, attaching a pump to keep the water circulating, moving the work while it is immersed in the tank. Agitation should be directed to carry water and contaminants toward the tank overflow.

Avoiding contamination in a spray rinse is no problem. Clean water is sprayed rapidly over the work to give a fast rinsing action. By having sprays operate, by automatic or manually-operated controls, only when necessary, water consumption can be kept lower than in a dip-rinse tank.

Spray nozzles should be arranged to throw an even spray over the entire surface of the work and directed to rinse thoroughly any recesses or holes. Work placement is important to effect such thorough rinsing and permit adequate drainage following the rinse. Even though the rinse tank has nozzles encircling the tank and directed at a slight angle, as usual for best spraying efficiency, each irregular or recessed workpiece should be studied to determine its best rinsing position.

A particularly effective rinse combines advantages of both dip and spray. A rinse tank may be arranged for the regular dip rinse, but as the work rises it is subjected to a pressure rinse of clean water that washes off any contaminants from the dip rinse.

Rinse-Water Temperature

Temperature of rinse water depends on rinsability of cleaner, method of rinsing and subsequent operations to be performed on the work. Hot water does a more thorough rinsing job than does cold water. Soaps containing rosin, stearic acid or tallow rinse more freely in hot water, because these substances dissolve much more slowly in cold water. Only vegetable-oil soaps are free rinsing, to any appreciable degree, in cold water.

In dip rinsing, therefore, hot water is preferred to cold water. But spray rinsing, because of the cost of heating all the water, is generally done with cold water, except where hot water is definitely needed. Certain cleaners are better spray-rinsed with hot water, such as in the rinse between an emulsifiable-cleaner presoak and an electro-cleaner.

A double rinse is preferable where it can be arranged, the first being hot and the second usually cold. For example, between electro-cleaning and acid dip, a spray rinse at 150 F. and a dip rinse at 60 to 65 F. give thorough rinsing, or the first rinse may be a dip at about 175 to 180 F. with, preferably, a moderate overflow.

Before plating, the final rinse must be cold because the work should be wet going into the plating solution to avoid oxide formation during transfer. When work is to be painted or enameled, a hot-water rinse is preferred so parts will dry from their own heat.

We Acknowledge . . .

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Industrial Washing Machine Co.
Metalwash Machinery Co.
Murray Corp. of America
N. Ransohoff, Inc.
Oakite Products, Inc.
Optimus Detergents Co.
Pennsylvania Salt Mfg. Co.
Philadelphia Quartz Co.
The Bullard Co.
Turco Products, Inc.
Wright Aeronautical Corp.
Wyandotte Chemicals Corp.

TAFT-HARTLEY ACT

Frees "Slave" Labor

THE TAFT-HARTLEY ACT is two months old. Its full meaning is yet to be determined by decisions of the National Labor Relations Board and the courts. However, on its face, the Act refutes the attacks made upon it by union leaders as hysterical and fanciful.

Management has had every provocation to reply to these attacks in kind. To the credit of the employers of this country, they have not succumbed to that temptation. They have maintained a temperate attitude toward the new law and the problems it is designed to correct. This approach is right. But it is only an approach.

Union leaders will want to settle for nothing short of *repeal.* Their attack on the Act has made some headway. It may be more effective as time goes on. *Certainly the Taft-Hartley law will be repealed if management just sits tight and lets union leaders continue to confuse their followers.*

Management, therefore, must implement its present temperate attitude with a program of positive action. The Taft-Hartley Act must be made to work not because management wants it, but because it is fair to labor — and management can do things right now to see that the Act works. Management can:

I. Utilize every means at its disposal to acquaint the rank and file of union workers with the truth about the Taft-Hartley Act.

II. Suggest amendments to the Act if experience indicates that amendments are necessary.

III. Use the law as little as possible in settling labor disputes.

IV. Stand firm in its refusal to bargain away the rights accorded by the Act to workers, management, and the public.

An examination of those four *must's* will show why they provide management with its best program of action.

I.

Union members do not know what the Taft-Hartley Act provides.

There is abundant proof of that statement.

While Congress was still trying to write a law that the President would not veto, FACTORY magazine asked workers how they felt about major proposals in the pending House and Senate bills. Overwhelmingly they felt good. They were in favor of almost every individual provision that was finally incorporated into the bill and passed over the President's veto.

The same story emerged from the national opinion poll made by the Opinion Research Corporation of Princeton, N. J. and published by Look magazine after the law was enacted. It showed that union members uniformly favored major provisions of the Act, but were strongly opposed to the Act itself.

This inconsistency is easily explained. Instead of telling their members what the Act does for them, most union leaders have been condemning it as "a slave labor law" because it curtails the leaders' power and recognizes the rights of the union member and the public.

It is not a slave labor law. All of the basic rights accorded to labor by the Wagner Act of 1935 are preserved by the Taft-Hartley law. All of the unfair labor practices that were forbidden by the Wagner Act are still forbidden by the Taft-Hartley Act.

Nothing in the law impairs labor's right to bargain through representatives of its own choosing.

The Wagner Act condemned as an unfair labor practice any effort by employers to coerce employees in the selection of their bargaining representatives. So does the new law.

The Taft-Hartley Act merely recognizes rights of individual employees, of management, and of the public that were ignored by the Wagner Act.

For example, while the Taft-Hartley Act continues the workers' protection from coercion by employers, it also gives them new protection against coercion by unions. The individual worker is freed from the necessity of joining a union to *get* a job. He may still be required to join a union to *keep* his job, but not unless a majority of the workers vote for such a requirement in a government-supervised election.

Some people think the Taft-Hartley Act is weak in protecting the rights of the individual worker. They think that membership in a union should never be made a condition for holding a job. This is true. However, the Act does restore to the individual worker some rights which were blotted out under the Wagner Act, just as it does to management and the public.

A fair examination of the new law's provisions will show that they spring from one dominating purpose: i.e., to re-establish equality before the law.

For example, under the Wagner Act union leaders were free to say whatever they pleased about the employer to his employees. The employer, on the other hand, was denied freedom of speech in talking to his own employees. Now freedom of speech is largely restored.

Under the Wagner Act the employer was compelled to bargain with a certified union. Now the union must bargain, too.

Under the Wagner Act, unions alone had the right to petition for an election to determine whether the petitioning union represented a majority of the workers. Now the employer also has the right to secure an election.

These are features of the new Labor law that management must help workers understand. They must understand why the Act is not the "diabolical monstrosity" Philip Murray tells them it is.

Some companies have already started to explain these things to their workers. Techniques are well established, and they are techniques that any company can use. They include labor law digests in language workers can understand, supervisory conferences to cover points in the Act that affects the supervisor's handling of his job, distribution of reprinted articles that point out how employees benefit from the new law, editorials in plant newspapers and magazines, and advertisements in local newspapers.

II.

Management should take the lead whenever amendments to the Taft-Hartley law become necessary.

For twelve years labor leaders wilfully opposed every attempt to correct obvious abuses in the Wagner Act. We have now proved that a labor law *can* be amended. Let us be sure that management does not resort to the same obstructionist tactics labor has always used.

In carrying out its basic purpose to re-establish equality before the law, the Taft-Hartley Act makes it "unlawful . . . for any corporation whatever or any labor organization to make a contribution or expenditure in connection with" national elections. Corporations have long been so restrained. The novelty is the balancing restraint upon unions, which now have huge financial resources amounting to very many millions of dollars. However, the language of the Act *may* restrain the labor press from saying what it thinks about candidates, thus impinging upon the freedom of the press. Senator Taft has recognized this possibility.

If it should develop that the Act inadvertently throttles freedom of the press—or misfires otherwise—management should take the lead in securing suitable amendments to the Act. By assuming a completely stiff-necked attitude toward any and all changes in the Wagner Act, no matter how badly needed, the dominant labor leaders and their political outriders finally brought on the sweeping revisions provided by the Taft-Hartley Act. Management must not follow that example of stupid leadership.

III.

Management will be wise if it uses the new law gently in settling labor disputes.

So far employers show no disposition to use the law excessively. That is good. An analysis of the NLRB's docket from August 22 to September 30 shows that approximately 90 percent of the cases now before the Board were filed by unions and employees—not by employers.

We have been surveying employers, asking if they will have occasion to use their right to sue their unions. The answer so far is consistently, *"no."* That answer frequently is accompanied by this remark, "We certainly hope not. We have no desire to conduct our labor relations in the courthouse."

The desired result should be for the Act to produce only those law suits that are matters of vital principle. As many employers have remarked, the courthouse remains the worst possible place to conduct labor relations. The best place is in the plant—by free collective bargaining between parties enjoying an equality before the law. The Taft-Hartley law will serve its most constructive role if it encourages this kind of collective bargaining.

IV.

Employers should not bargain away legal rights accorded to them by the Taft-Hartley Act.

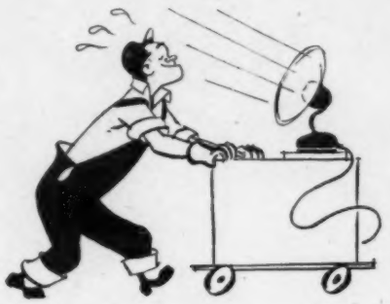
By bargaining away rights given them in that Act, employers serve only to upset a carefully created balance of equality before the law which is an essential element of fair collective bargaining.

Also, by bargaining away rights properly accorded to them, they let down those members of Congress who, in voting for the Act, braved continuous threats of political assassination by powerful union leaders. For their statesmanship in the complicated field covered by the Taft-Hartley Act these Congressmen deserve the support and gratitude of the whole nation—of management, of labor, and of the public alike.

Fairly handled on all sides, the corrective force of the Act can be made a major bulwark of industrial freedom.

President, McGraw-Hill Publishing Company, Inc.

TALKING SHOP



Wring Out the Air

DURING the late-summer hot spell, production fell off or stopped in many plants. But some companies treated the emergency sensibly, concentrating fans where the heat and humidity were greatest. At Jack & Heintz, office personnel even chipped in their fans for the ball-bearing dept. As a result, air circulation increased evaporation of worker perspiration, drawing off body heat in the process. Production actually went up instead of down. Remember fans next summer if you have no air-conditioned shop.

Compact Brake

TAKING its own medicine, Bendix-Westinghouse Air Brake, Elyria, O., applied its air-brake chambers to shop assembly, clamping, pressing and testing fixtures. As a result, a new type of close-coupled unit was developed, in which a sealing diaphragm rolls on and off a piston to make a practically frictionless seal. Cost is under $10 a unit for all but infrequently used large sizes, and over a million cycles without failure. Not a new, but a very practical, method of product development—trying it in service in the plant where it is built.

Tripled Life

CONTINENTAL is making Thompson "Rotovalves" and chrome-plated heads optional on new heavy-duty engines. Turning the valve a few degrees on each lift, valve-seat inserts and plated heads have extended mileage between truck and bus engine overhauls from 100,000 to 300,000, according to reports. The chrome plate, among other things, seems to stand lead erosion better than the unprotected head.

Continental has also installed induction hardening for main journals and crankpins on the heavy engines. These engines can be operated on either gasoline or diesel fuel, bearing pressures on the diesel cycle being double those on the automotive-engine Otto cycle.

Roll Threading

DIES of tungsten carbide are being used to give accuracy in roll threading to Class 3 threads . . . Heat-treated connecting-rod bolts (Rockwell C 35) are being successfully roll-threaded . . . Plunge-cut grinders are used to sharpen hardened roll-thread dies.

No Sale

OWEN D. YOUNG once said that there is only one reason that 99 out of 100 men don't become leaders—their unwillingness to pay the price of responsibility. To him, the price is "hard-driving, continual work—the courage to make decisions, to stand the gaff . . . never fooling yourself about yourself."

Detroit Story

THEY SAY that K. T. Keller, president of Chrysler, asked George Fink, president of Great Lakes Steel, if more steel couldn't be gotten out for Chrysler. Said Fink, "We're giving you everything but the holes now." Said Keller, "Then ship us the holes, too!"

One Punch

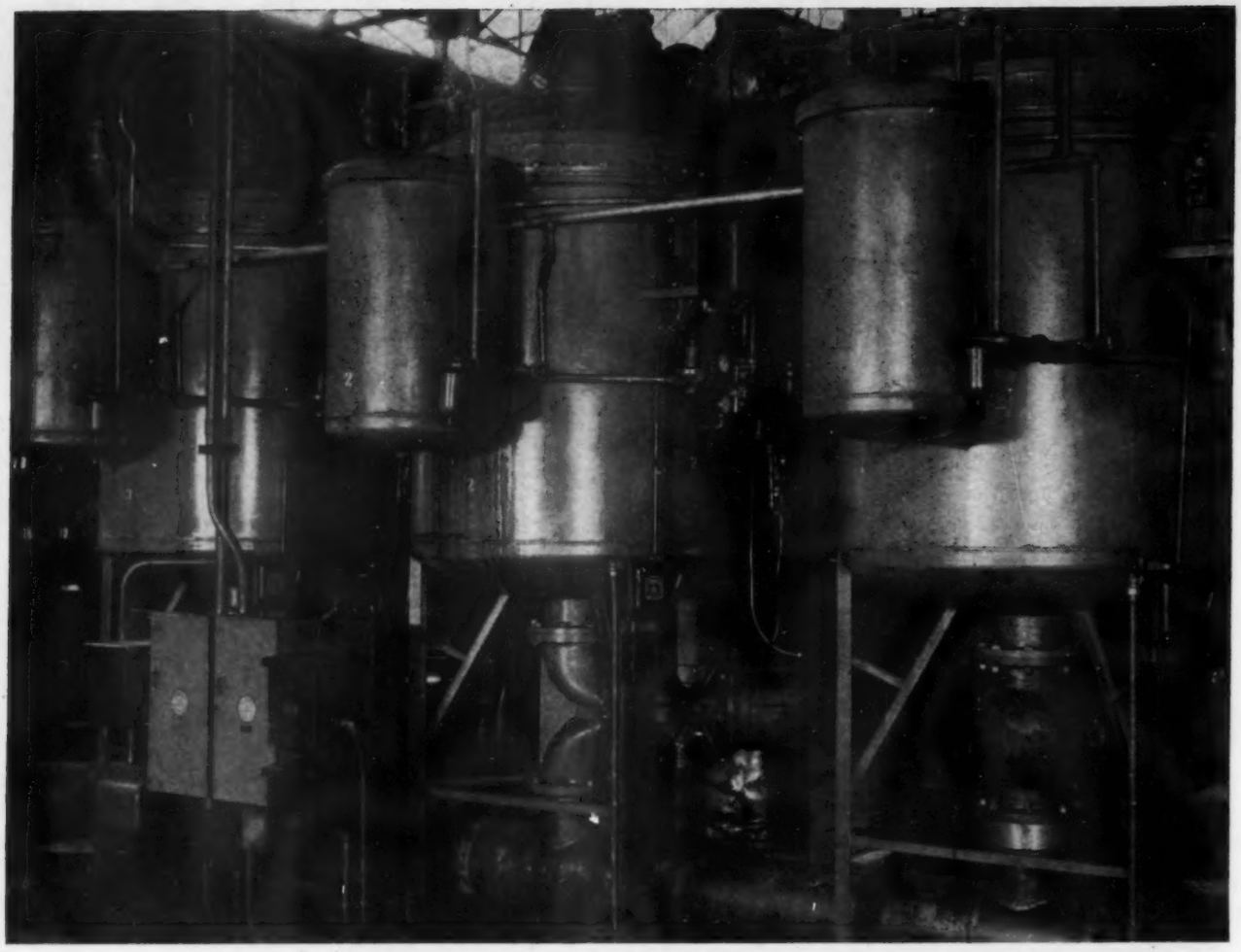
ALL SIX TO EIGHT holes in both halves of an auto or truck wheel hub will be punched simultaneously. Hannifin has the order for high-pressure hydraulic punches. The pieces are moved to a hydraulic riveter for one-stroke assembly.

Back-yard Godfather

FITCHBURG Grinding Machine Co. sought a name for its new grinder, which feeds work peripherally around a portion of the wheel. The company didn't hunt a professional godfather, but offered a $25 prize for the best name suggested by one of its own shop men. The name, since adopted, which won was "Consta-Contact," for constant contact, a quite-accurate description.

Titanium Forks?

TABLEWARE, jewelry and such may be made from zirconium and titanium, dreams Dr. John W. Marden, Westinghouse metallurgist. Both metals are strong, light, and take a high polish which won't tarnish. As rare metals, they command a high price now, but large-scale production would bring them into line with other metals, he thinks.



Two out of three filters are always working. Meanwhile the third is blown down to remove chips and oil. Automatic timers control the sequence and the closing and opening of proper valves

FORD THROWS OUT FILTER BAGS

Gone is the mess associated with this method of removing chips from grinding coolant. And centralized filtration is making savings in several ways

BY RUPERT LEGRAND
ASSOCIATE EDITOR

MANAGEMENT and men like the shift from filter bags to centralized filtration for the piston department, Ford Motor Company. That it is no economy to retain filter bags on a large group of grinders is proved by the tabulated figures.

But in addition to paying back the equipment cost in five months, centralized filtration produces these results, according to Ford experience.

1. Better finish is secured on aluminum pistons. No stray chips are present in the filtered coolant. Hence flat spots, created by a chip getting between work and wheel, are no longer a cause for scrap.

2. Wheel wear is reduced. Commensurate reductions in redressing, wheel consumption and machine downtime are noted.

3. Department personnel approve the change on the score of better housekeeping. Filter bags leak, coolant get on the floor.

4. Workers formerly assigned to the various maintenance and cleaning jobs required with the former filter-bag system can (and have been) transferred to more agreeable and productive occupations.

Incredible as it may seem, the operating costs of the battery of three Honan-Crane filters amounts to a few hundred dollars monthly, as compared to several thousand dollars to maintain the filter-bag system. That is why the installation paid for itself in five months.

Operating details of the installation are:

Dirty soda-water discharged from the grinders flows down a plate-covered trench to a dirty-water pit (See drawing). Here, the water flows through a vertical baffle to a pump that forces coolant into the screen-type filters at 15-20 psi.

TYPICAL MONTH'S COST COMPARISON

(113 GRINDERS SERVED)

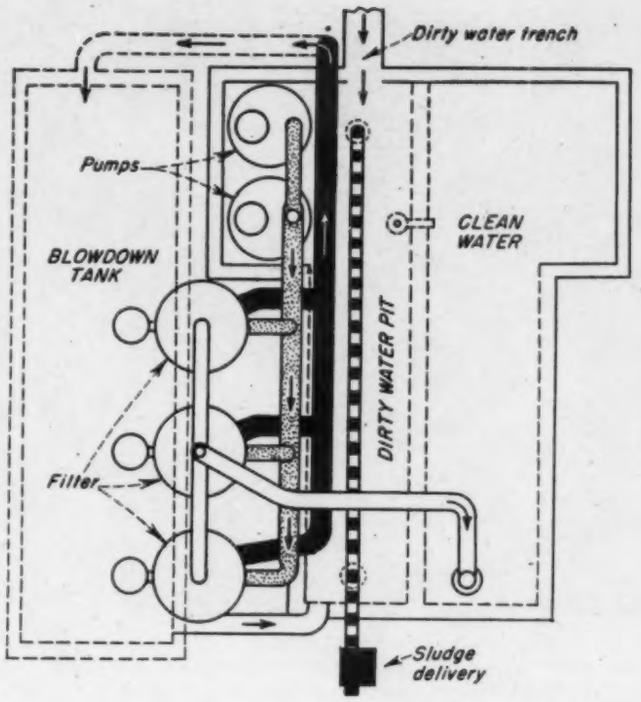
Old Method—Filter Bag System

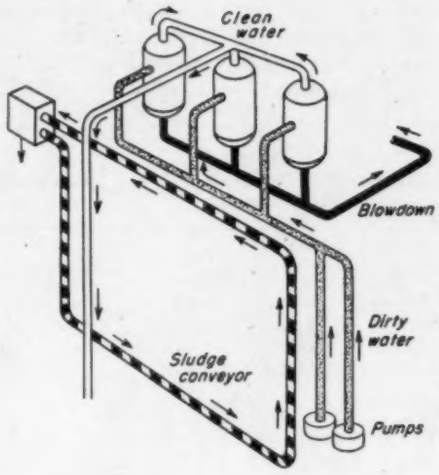
Filter bags used	10836
Manhours to change bags	3024
Cleanings of settling pits	8
Manhours to clean pits	210
Soluble oil consumption*	4166g
Disinfectant used	440g

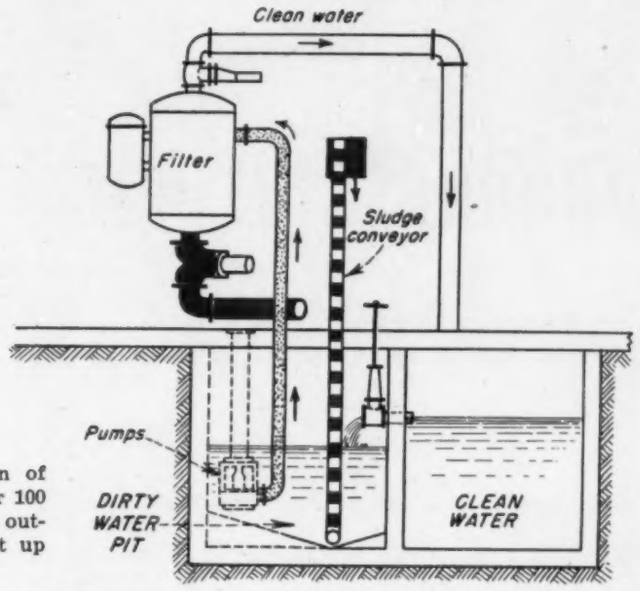
*Soda-water replaced weekly

New Method—Centralized Filtration

Soda-water lasts 5 to 7 mo.	
Disinfectant used	10 g. per mo.
Machine oil	reclaimed
Net savings in operating expense	96.5%







Reasonable floorspace is required for centralized filtration of grinding coolant, considering the volume received from over 100 machines. Installations can be engineered to take the entire output of coolant at one point, or the equipment can be split up according to departmental areas and arrangement

Fluid in dirty water tank is agitated to avoid chip clogging. Flow is directed so that chips properly enter a plug and chain-type sludge conveyor, which discharges continuously to dump cart.

Three filters are aligned in a battery. Two of these three filters are always "on the line," discharging to the clean-water pit. Meanwhile the third filter is being blown down with compressed air at 100 psi. Blowdown occurs every 60 seconds, has a duration of 9 sec. Automatic timers control blowdown sequence of the three filters.

When the blowdown cycle starts, the dirty-water inlet valve at side of the filter is closed, likewise the clean-water outlet valve at top of filter and the blowdown valve at bottom of the filter opens. Oil and chips clogging the filter screens are blown into a three-section baffle-type settling tank. Water in settling tank goes back to the dirty-water tank for refiltering. Machine oil is skimmed off at intervals and sent to a reclamation department. Chips are continuously removed by a Honan-Crane sludge conveyor. The blowdown tank is designed to allow maximum separation of chips and swarf from the coolant. The outlet pipe is 6 in. higher than the inlet.

If the level in the clean-water pit rises too high, coolant overflows into the dirty-water pit.

Pressure filtration with blowdown is essential because aluminum chips tend to form a mud that clogs the screens. But, as stated, the economies of the Honan-Crane installation are so great that Ford Motor Company officials took advantage of the opportunity, and directed further attention to other coolant-filtration problems.

Fig. 1—Slippery runways and brake steps are a thing of the past when safety-tread plates are substituted for wood. Morton "Open Grip" steel tread members grip shoe soles in nice or nasty weather. *Courtesy Pullman-Standard Car Mfg. Co.*

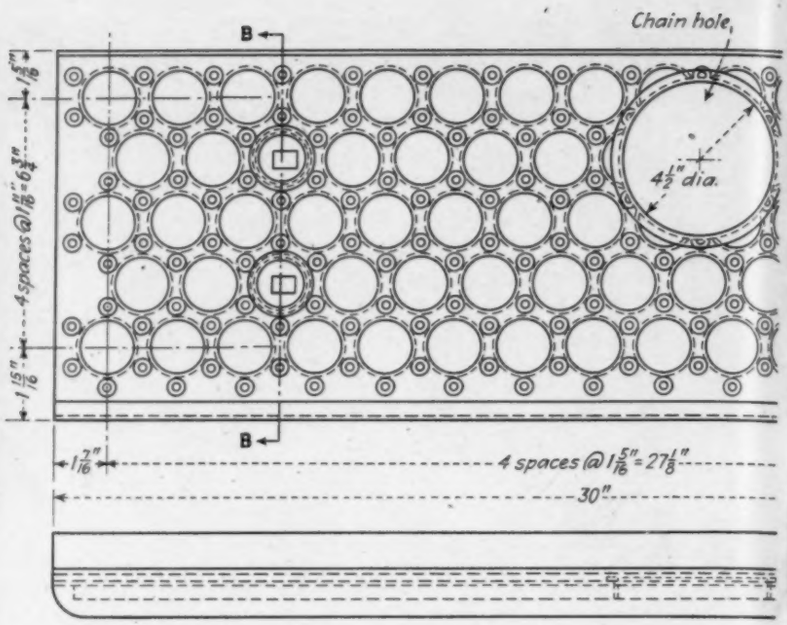
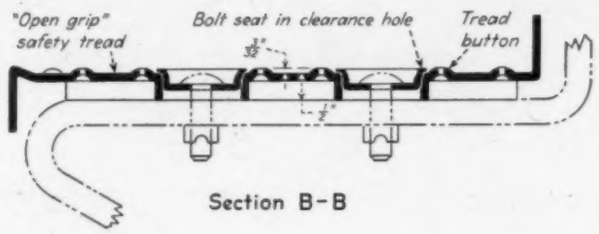


Fig. 2—Embossed tread buttons and drawn clearance holes in this Morton safety brake step could not be produced economically until a special progressive die was developed. Six embossed and pierced tread buttons circle each clearance hole



PROGRESSIVE DIE PRODUCES SAFETY RUNWAY

BY J. A. KING, VICE PRESIDENT MORTON MANUFACTURING COMPANY

Perforating and embossing die is arranged with mechanical stock feed and several gag bars to control punch action

SAFETY-MINDED RAILROADS rapidly are replacing old-style, hazardous wood running boards or "cat walks," brake steps and platforms on boxcars with safety-tread steel plates. This effects a considerable reduction in hazard for trainmen who must walk or run over car tops in all kinds of weather.

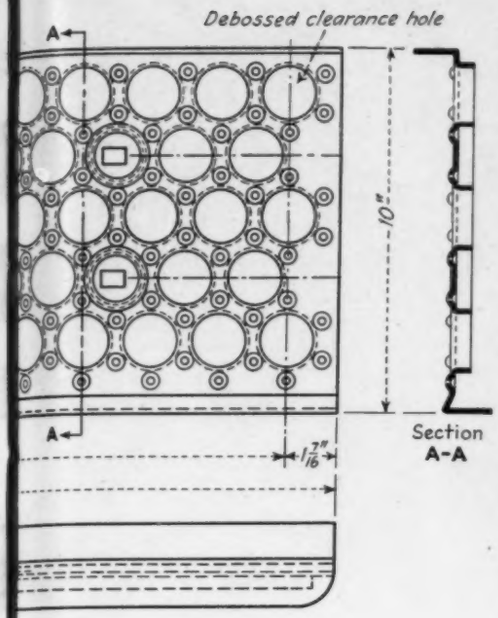
To fill this need, we have developed the "Open Grip" safety tread in which are combined carefully spaced ⅜-in. dia. and 3/32-in. high tread buttons and 1½-in. dia. clearance holes that keep runways clear of ice, sleet and snow. Each tread button, pierced with a 9/64-in. dia. hole, has an edge that grips the soles of shoes worn by trainmen walking across or standing on these surfaces. The result is an open grid (Figs. 1 and 2) having a high safety factor.

Progressive Perforating and Embossing

Production of these tread sections would not have been possible at a reasonable production cost without the use of a special progressive perforating and embossing die. Constructed principally of Holliday "Speed Case" free-machining steel (by Kindwall Brothers), the die is arranged so individual punch and die units can be removed or replaced as required for producing different widths of runway surfaces.

Also, individual rows of punches can be made operative or inoperative in succession as required for finishing the proper pattern at the start and end of each section. This is accomplished by "gag" bars moved by pneumatic cylinders controlled from the press-operator's station.

All "Open-Grip" safety-tread sections for boxcar runways, platforms and brake steps are fabricated from No. 12 gage mild, open-hearth, copper-bearing, deep-drawing steel (SAE 1010), and are hot-dip galvanized after fabrication for protection against rust. After the required section has been perforated and embossed in the die, sheets are cut to size in trimming shears and necessary flanges are formed on press



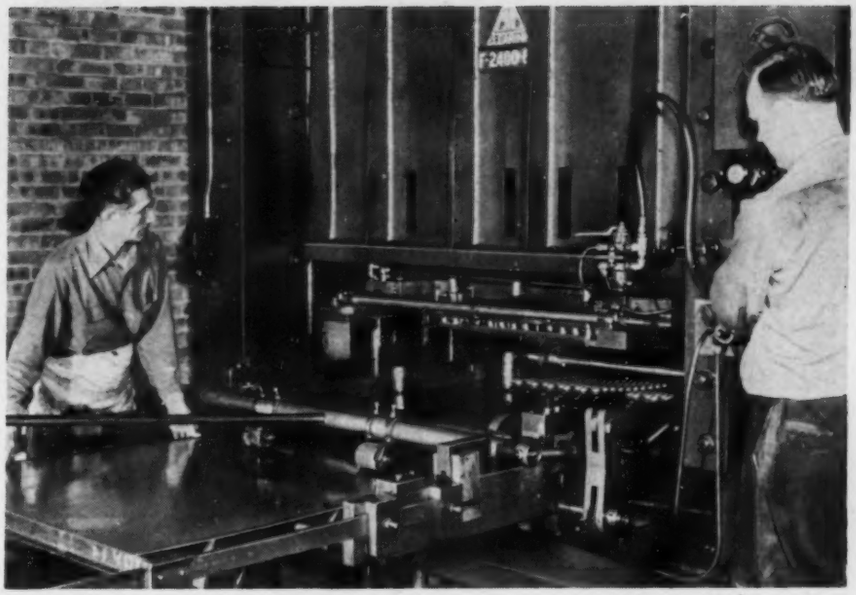


Fig. 3—Sheet-feed mechanism is operated by ratchet from a lever connected to the press ram. Air-controlled gag bars make rows of punches operative or inoperative as required so the safety-tread feature can be continued almost to the end of the sheet or stopped according to design requirements

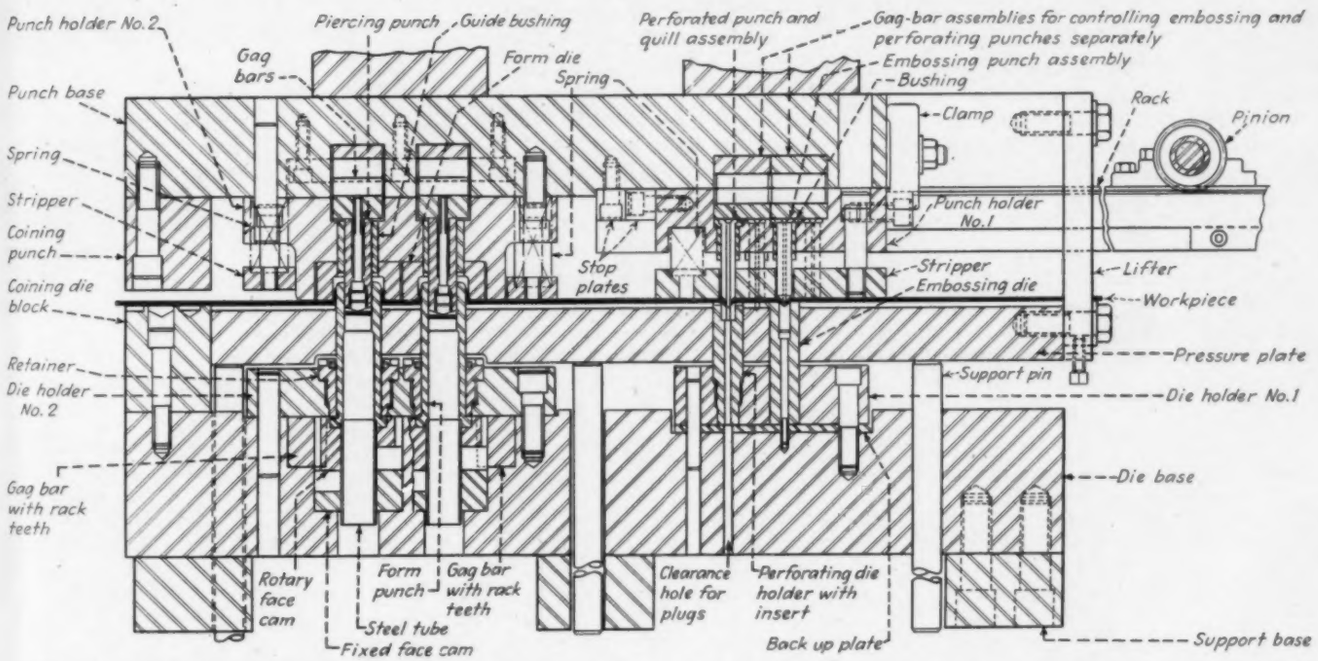


Fig. 4—This longitudinal cross-section of the die shows successive operations performed on the sheet as it traverses from right to left. First, tread buttons are embossed and partially perforated. Next, perforating is completed, then clearance holes are pierced and drawn. At the end is a coining station where drawn walls of clearance holes are sized to a common height of ½ in. The lower coining die member is drilled to clear tread buttons

brakes before they are glavanized.

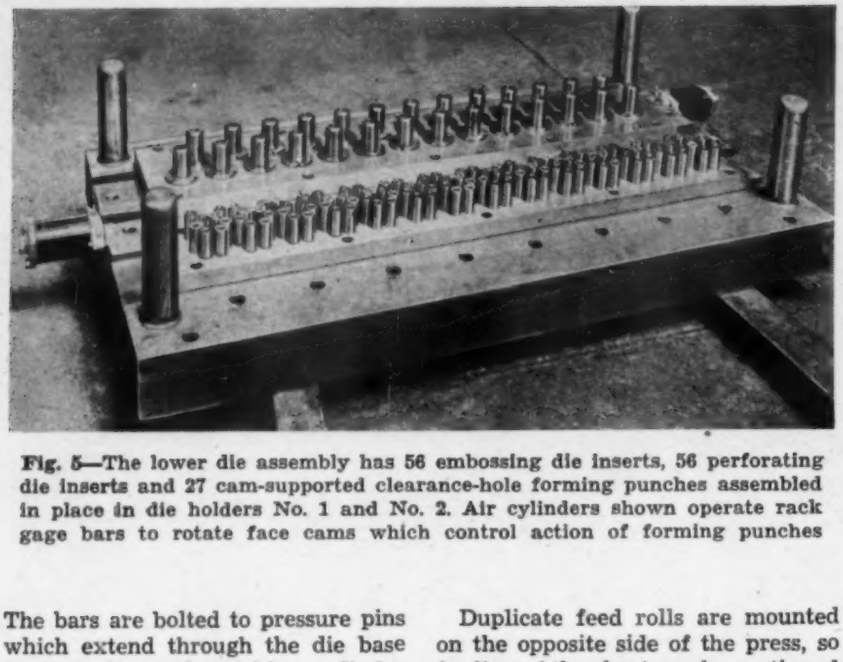
"Open-Grip" safety-tread sections are formed (Fig. 3) in Type F-2400-84 Clearing double-acting presses having 12-in. strokes and operated at 20 strokes per min. These presses run 24 hr. a day when sheet material is available.

Approximately 2,000 units can be completely fabricated each week. At the end of a work week the punches, made of hardened tool steel, are inspected and worn surfaces are reground where necessary. Service life of punches averages about a year—an unusually good performance for this type of work.

Sheet sizes range from 32 to 48 in. in width and from 84 to 105 in. in length, depending on the tread surface to be produced. Usually, box-car-runway and brake-step sections are perforated and embossed in two strips lengthwise of each sheet, and then the two surfaces are separated by shearing in a second operation.

Mechanical Sheet Feed

The sheet-feeding mechanism is constructed as a part of the die assembly and is supported on two long side bars extending from both sides of the press at each end of the die.



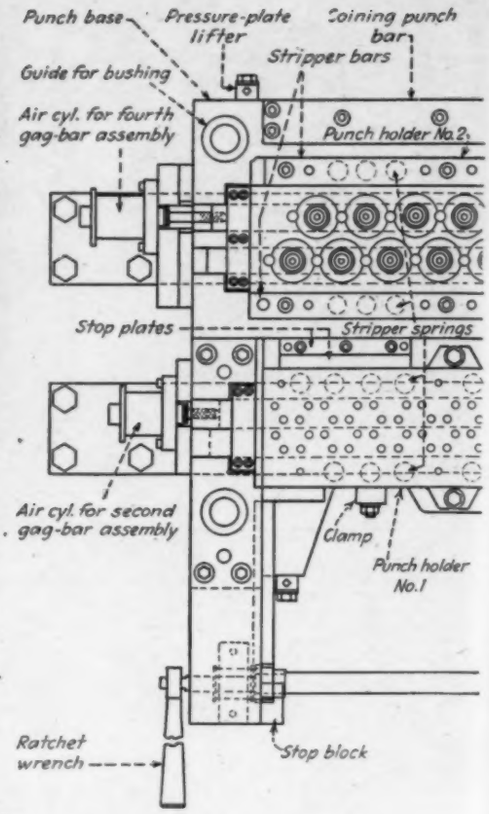


Fig. 5—The lower die assembly has 56 embossing die inserts, 56 perforating die inserts and 27 cam-supported clearance-hole forming punches assembled in place in die holders No. 1 and No. 2. Air cylinders shown operate rack gage bars to rotate face cams which control action of forming punches

The bars are bolted to pressure pins which extend through the die base to the pneumatic cushion cylinder in the base of the press.

Before insertion into the feeding mechanism, the steel sheets are individually hand-swabbed on the top surface with a heavy drawing oil. As one sheet feeds through the press, the next sheet is made ready so it can be inserted to follow immediately through the die stages.

Feed is obtained from pairs of 6 5/16-in. dia. 1¼-in. wide knurled rolls held together under spring pressure so accurate feeding is possible. Each lower drive roll has a 7⅛-in. dia. flange on its outer face to guide the sheet as it enters the die. Feed of the sheet between press strokes is 1 15/16 in.

Duplicate feed rolls are mounted on the opposite side of the press, so feeding of the sheet can be continued at the same accurate rate after the sheet has passed from the first set of feed rolls. Feeding, therefore, continues until the entire sheet has passed through all stages of the die. When this occurs, the press operator and his helper lift the sheet from the feed mechanism to a truck load of sheets waiting transfer to the shears.

Fig. 4 shows a section of the die taken in the direction of sheet feed, with the sheet feeding from right to left. First, the sheet passes through a double row of embossing punches and dies and then through a double row of perforating punches and dies. These produce completed tread but-

These produce completed tread but- encircle the pierced and drawn clearance holes produced in the second section of the die.

As the sheet leaves the die, the "debossed" clearance holes produced by the combination piercing and drawing punch and die sets are coined to the required ½-in. height. This is accomplished between two hardened steel coining bars at the left-hand side of the die. The lower

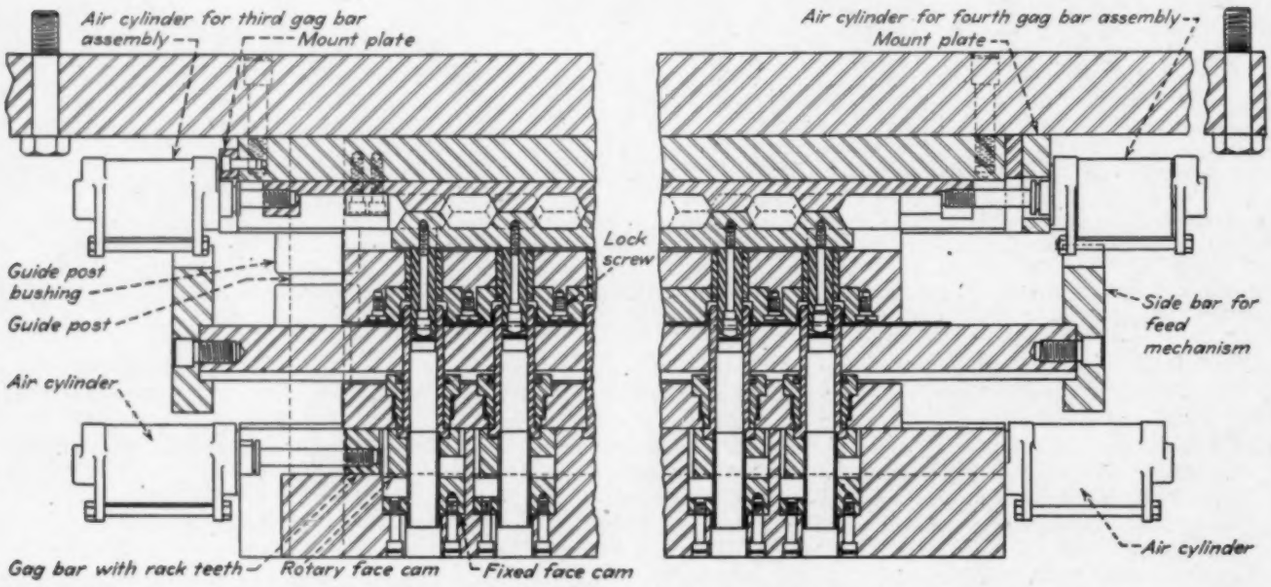


Fig. 8—This transverse cross-section shows one line of embossing punches controlled by gag bars shown in section above the punches. This pair of bars is controlled by left-hand air cylinder of 1⅛-in. stroke

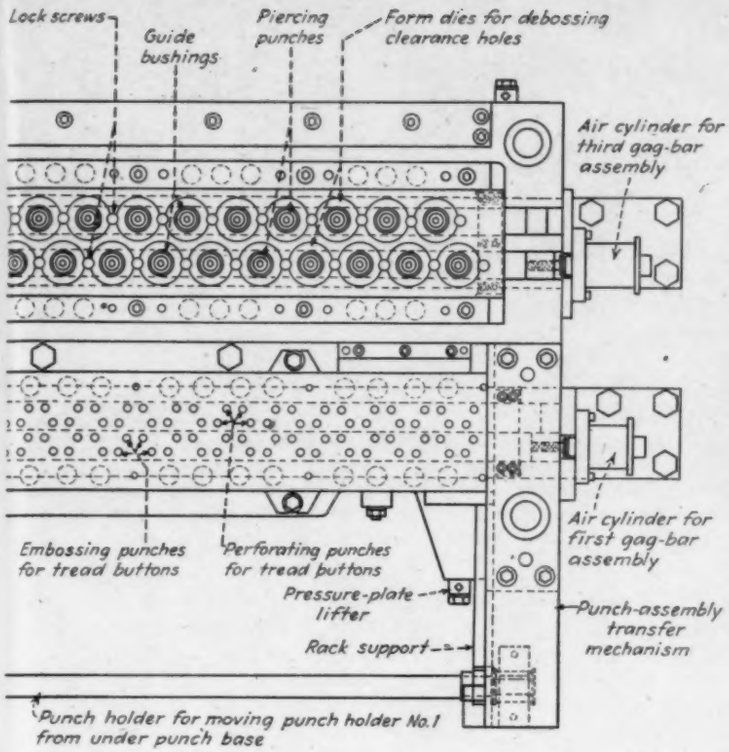

Lock screws
Guide bushings
Piercing punches
Form dies for debossing clearance holes
Air cylinder for third gag-bar assembly
Air cylinder for first gag-bar assembly
Embossing punches for tread buttons
Perforating punches for tread buttons
Pressure-plate lifter
Punch-assembly transfer mechanism
Rack support
Punch holder for moving punch holder No.1 from under punch base

Fig. 6—This plan view of inverted punch assembly shows how tread-button embossing and perforating punches are grouped in punch holder No. 1 and how clearance-hole piercing punches and forming dies are grouped in punch holder No. 2. Punch holder No. 1 can be slid out from under the punch base on rails to facilitate renewal of perforating punch inserts, or removal of entire punch units not required. Each gag bar controls an entire line of punches. Individual control with gags was not needed and would have made die cost prohibitive

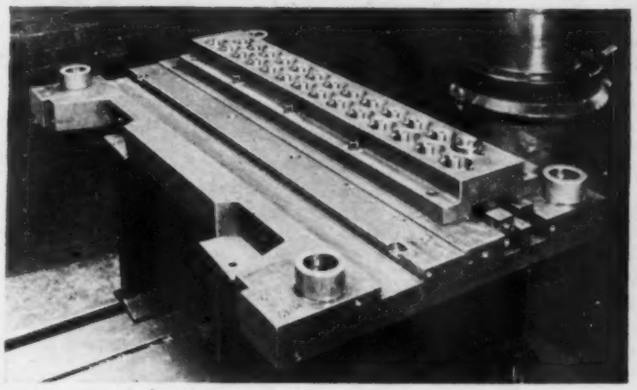


Fig. 7—Partially assembled punch unit shows all 27 clearance-hole piercing punches in place with two pairs of gag bars which control their operation

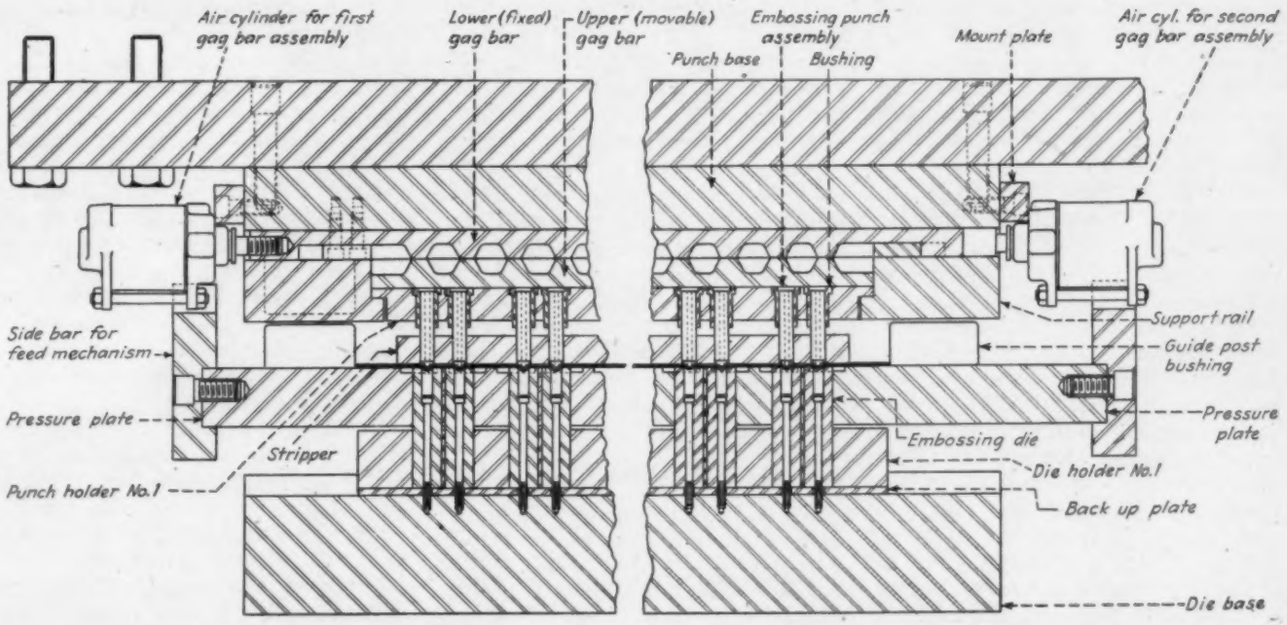


Fig. 9—This transverse section of the die assembly shows how gag bars control operation of clearance-hole piercing and forming punches. Upper pairs are similar to those employed for embossing and perforating punches, while rack bars are employed for operating rotary face cams that control operation of the lower forming punches. Slugs pierced from the plate at this station drop through the forming punches to a clearance area between parallel bars on which the lower die base is mounted, and are raked out at frequent intervals

coining die bar is drilled to clear the embossed tread buttons. It will be noted that the sheet as produced in this die is upside down.

Die Construction

The die base is machined from a piece of "Speed Case" plate measuring 5 x 32 x 58 in., while the punch base is made from a 3¾ x 33 x 58-in. piece of "Speed Case." The pressure plate, mounted between the upper punch assembly and the lower die assembly, is 2¼ in. thick and measures 32½ x 62 in.

The pressure plate is supported from the punch-base plate by four lifter bars, in each of which the upper bolt hole is slotted to permit vertical movement of the plate as the punch assembly is moved by the press ram. The die base is mounted on three 2¾ x 4 x 57¾-in. bars so slugs produced by piercing punches can be raked out from under the die base, with the rake extended through holes cut in the side columns of the press.

Embossing punches are drilled and reamed axially to clear the 0.1560—0.0563-in. dia. high-carbon, high-chrome nickel steel punches which start the perforating operation and

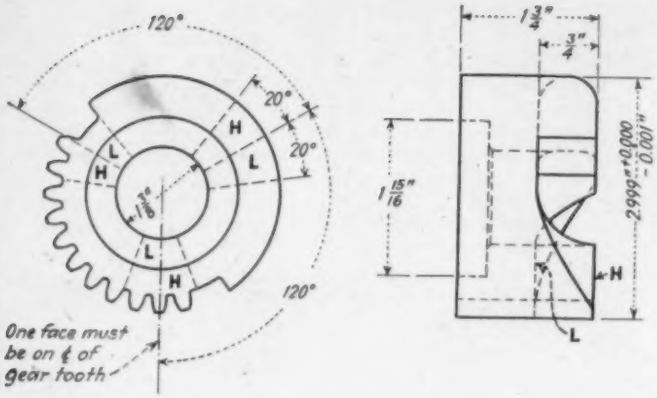


Fig. 10—The rotary face cam has three lobes, each with 2/3-in. rise in 80° and 2.998—2.999-in. dia. The gear sector has 11 teeth of 10 diametral pitch on a 2.8-in. pitch diameter, with one tooth centered on a lobe face

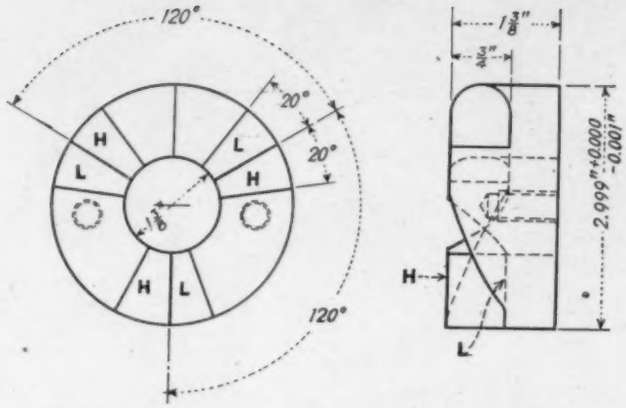


Fig. 11—Designed to fit in a counterbored cavity below the forming punch whose height it controls, the fixed face cam mates with the rotary face cam to control extended height of the forming punch. High and low faces are marked

thus relieve the load on piercing punches in the next die stage. Embossing punches are contoured to produce the desired tread buttons in one operation.

Piercing punches in the second die stage are 0.1410—0.1406 in. in dia., alternate punches being ⅛ in. longer so half the piercing punches clear the work before the other set enters the work, thus dividing the load on the press. Likewise, piercing punches for the clearance holes at the other side of the die alternately are ⅛ in. longer or shorter than those on either side. Tread-button piercing punches are beveled 15° to either side of center; this also is done to reduce load on the press.

Forming punches for clearance holes are made from high-carbon, high-chrome nickel steel, hardened and ground to 1.500—1.501-in. dia. These punches are in turn the piercing dies against which the upper punches work. At the same time, they draw the sheet into the form dies which surround the piercing punches in this section of the die.

The form punches are supported on three-lobe face cams mounted in pairs at each punch station. The lower cam is bolted in place to prevent rotation, while the upper cam has a gear sector cut in a portion of its periphery so cams in each row can be rotated by a gag bar having rack teeth cut in its face.

Turning the upper cam through 80° permits the forming punch to drop below its normal position, thus making it inoperative. Gag bars of different shape control the punches in the upper assembly, one set of gag bars controlling each row.

Arrangement of the 56 embossing dies, the 56 piercing dies and the 27 clearance-hole forming punches is shown in Fig. 5. This photograph of the lower die assembly also shows two air cylinders which operate the lower gag bars controlling rotary cams under the form punches. For this photograph, the pressure plate and its support pins have been removed.

Arrangement of mating punches and forming dies mounted in the upper punch base is shown in Fig. 6. This plan view shows the punch assembly in inverted position and the mounting of the four air cylinders incorporated in this assembly for moving the gag bars. Also shown are the rails on which embossing and perforating punches are moved from under the punch base to permit easy renewal of broken punches. These are of such small diameter that this special arrangement was found desirable while developing this die set.

Punches Controlled by Gag Bars

Each double line of embossing and perforating punches for tread buttons is controlled by a separate gag bar, so either set can be made inoperative by movement of an air valve at the operator's station. The same is true of the two lines of piercing punches for the clearance holes shown in the upper section of this view.

Fig. 7 shows the punch base with the punch holder for the clearance-hole punches and forming dies in process of assembly. The two sets of gag bars for these punches are in place. To the left is the mounting position for the tread-button embossing and perforating punches with the slot into which are assembled the two sets of gag bars which control these punches.

A transverse cross-section of the die across one of the lines of embossing punches and dies is shown in Fig. 8. This view shows the feed-mechanism side bars mounted on opposite ends of the pressure plate. It also shows the design of one of the four upper pairs of gag bars.

The pair of bars shown in section is in position to make the punches operative. When the upper bar is moved approximately ¾ in. by the air cylinder at the left-hand side of the die, high points on the mating gag bars then will be out of line and one bar will nest within the other. This permits punches under this pair of bars to rise as the press is closed.

Fig. 9 shows how a similar pair of gag bars is used to control the piercing punches in the upper assembly at the clearance-hole portion of the die assembly.

To insure against pierced slugs catching in the face cams, each forming punch carries in its lower end a 3½-in. long section of 1¼-in. dia. seamless steel tubing. This tube is threaded into the lower end of the punch and then locked with solder.

Details of the rotary and fixed face cams for the clearance-hole forming punches are shown in Figs. 10 and 11. Each face cam has three lobes and is designed for ¾ in. rise in 80° of rotation. The gear sector on the rotary cam has 11 teeth of 10 diametral pitch. Pitch diameter is 2.8 in. and pressure angle is 14½°.

"Speed Case" steel, from which most of the die parts are made, was selected because of its free-machining characteristics. It helped keep the cost of this complicated die assembly within reasonable bounds and gave good mechanical and physical characteristics.

The Foreman Can't Do Everything

BY R. A. SEIPLE, METHODS ENGINEER, EUCLID ROAD MACHINERY CO.

METHODS ENGINEERS are a much maligned race, and because I belong to that profession myself it is possible that my viewpoint may be a little onesided. But it does seem that the stand taken in a recent Round Table is open to some discussion, and that the Department foreman is not the man for improving methods. There are many good reasons for this statement, four of the more basic of which I shall attempt to sell to all disbelievers.

First is the matter of available time. It is conceded that foremen's duties vary in different plants, but here are a few of the routine tasks generally assigned to them:

1. Getting the right man on the job at the right time.
2. Economical use in placement of material.
3. Attendance control — Absenteeism and tardiness.
4. Accident prevention.
5. Keeping the men satisfied.
6. Adjusting grievances.
7. Maintaining discipline.
8. Keeping records, making reports.
9. Plan and schedule work.
10. Maintaining quality and quantity of production.
11. Requisition tools, supplies, equipment.
12. Inspection of tools and equipment.
13. Give orders and directions.
14. Cooperate with other supervisors.
15. Check raw material.
16. Settle personal differences.
17. Promote teamwork.

Pick out, if you care to, the items assigned to your foreman, and evaluate the time per day required for each function. If he is doing a good job in each phase, it is my guess that his day is pretty well taken up.

Second is the item of outside contacts. Undoubtedly, the foreman does not have the opportunity to discuss common problems with outside sources. The tool salesman, designer or engineer who comes around is usually sifted through the purchasing dept., and seldom sees the foreman. Frequently this is requested by the foreman himself because he is just too busy to be bothered by outside interference. Hence, new developments, ideas and advancements may escape the man closest to the scene.

This is best explained by the definition given by Webster, "A settled habit or course of procedure." You've guessed it, a "rut." A foreman, rest his soul, is only human. Doing the same job day in and day out, he, like everyone else, falls into a course of procedure that varies in intensity with the scope of the job.

Various steps have been taken by far-sighted management to correct this condition. Foremen rotation has been tried, with marked success, preventing foremen from becoming settled, and thereby increasing their value to the company. In addition, the rotation plan acts as a methods improvement plan. When two people view a problem there are usually two ideas born as to how it should be solved. When there are two or more ideas, thinking results, and thinking removes the problem.

Most plants, however, find foremen rotation too costly a problem from the standpoint of training. That is the time when a methods engineer is the obvious answer. His entrance into the picture stimulates thinking and removes the details and follow-up from the foreman.

Fourth is the position of the foreman himself. Actually, the foreman is the most potent individual in the organization. He reflects the company's policies and influences men's thinking regarding their position within the company. He should have the time to develop in his men, interest, understanding, and confidence toward himself.

If, in addition to the duties already outlined, he must assume the endless task of methods improvement, I will say, "Make me anything, but never make me a foreman."

OUR SHOP...30 — *Precision Assembly Dept.*

ROUND TABLE

Coddle or Cull?

"Say, Ed, it's as quiet as a graveyard around here today! Where are all of the boys?"

"Darned if I know, Al. Just about half showed up today. As usual, I guess they're supposed to be 'sick'. With all the work to be done, it about makes me sick too."

"Whoa, you sound mighty disgusted. Don't let it get you down. What do you mean they're supposed to be sick? Perhaps they are."

"Well then, it's mighty funny the same ones are sick every week. Look, I've been in this game a long time, and I've never seen as much apparent disregard for responsibility to be on the job. It even goes further than that. Some of these guys just walk out, and don't even say they're quitting. Half the time, you're not sure who has quit and who hasn't. It makes things tough."

"I see what you mean, Ed. But isn't it just a little letdown after the war? It ought to straighten itself out soon."

"That's what I thought months ago, but it's dragged on too long now. I think the only thing to do is to get tough. By George, we never had any trouble like this in the old days. If a fellow couldn't be depended upon, we just got someone else to take his job."

"Are you sure you weren't too tough? With a 'get tough' attitude, a lot of innocent fellows could get hurt, and that wouldn't be good."

"Oh, no, Al. It's easy to spot the dependable fellows, and getting tough even helped straighten out some of those that weren't. The old timers remember the way things used to be. It isn't those guys that are always absent today. No! No! It's the young fellows that never came back from a couple days off and found new men working on their jobs."

"How about the floaters you had though? I wasn't around, but I understand journeymen really got their name from all the jobs they tried."

"They sure did, and it was darn good experience, but when you quit a job, you always told the boss—even if it was at a minute's notice. Now I've got to give a guy twenty-four hours' notice before I can lay him off, but he doesn't bother sometimes to even tell me when he quits."

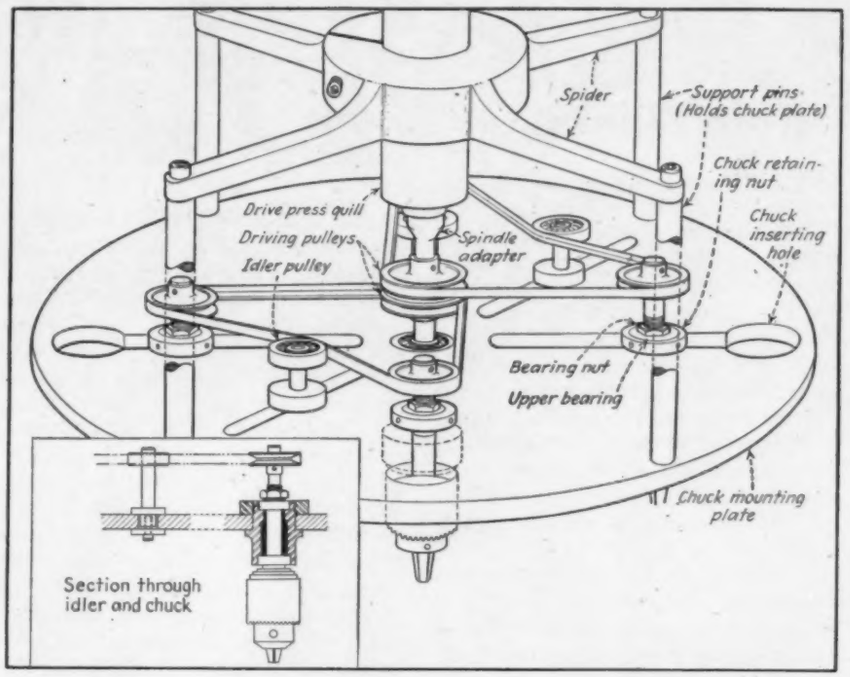
"I guess it is quite a problem, Ed, but I think everybody realizes it and is trying to solve it without getting tough. I notice some of the big outfits are tying in their holiday pay with that problem. A guy doesn't get holiday pay unless he works both sides of the holiday and has seniority."

"Yeah, but there's not enough holidays in a year for that to be the answer. I think everybody concerned should just get together and straighten out these guys that are always absent and who quit without notice. It's for their own good."

"Well, I think it's better to use more tact. You can't get tough because workers are hard to get in a lotta places. All we have to do is give a little more recognition and reward to guys that are dependable, and the others will fall in line."

***IS STRICTNESS** an answer to absenteeism? How can you handle the floater? Other readers will be interested in your experiences or ideas. Discussions of earlier questions appear on later pages.*

Practical Ideas



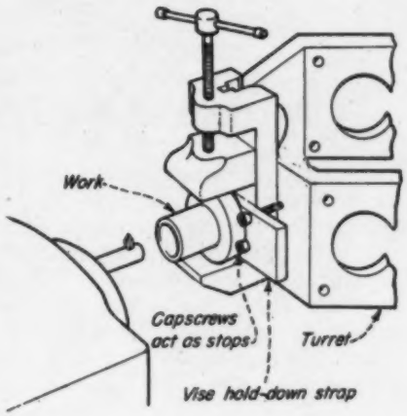
Multiple Drilling Attachment Handles Many Different Jobs

Four holes arranged on a 10-in. dia. circle were required in considerable quantity and our only available tool was a standard 17-in. drillpress; a multiple-spindle machine was out of the question. This four-spindle attachment has proved most satisfactory from the operational standpoint and has cut production time way down for, not only are the holes drilled simultaneously, but also one setup replaces four.

Power is transmitted from the drill spindle to the auxiliary spindles by means of V-belts and pulleys. A special arbor goes in the machine chuck or taper, as the case may be, and this carries one pulley for every two spindles to be powered.

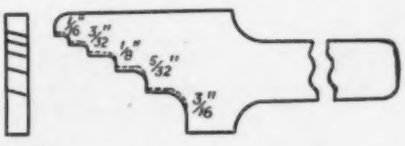
The auxiliary spindles are positioned and supported by a drilled plate suspended on the drill frame by a spider casting and pins. The spindles themselves, mounted in ball bearing adapters, fit into slots in the plate and are clamped in position with a nut on the adapter body. Adjacent spindles are driven by a common belt from one of the central driving pulleys so each pulley has an adequate arc of contact with the belt. Ball-bearing idler pulleys are provided for ready adjustment of belt tension.

Setup adjustments are easily made using a templet to place each chuck correctly, and this particular four-spindle unit can handle a wide range of four-hole setups. Special plates could be made up quickly, of course, varying the number of spindles and their arrangement, and by adding an indexing device between the clamp and the spider, the unit could be converted into a turret for performing successive operations on a piece without changing tools. *W. H. McCullough, Indianapolis, Indiana.*

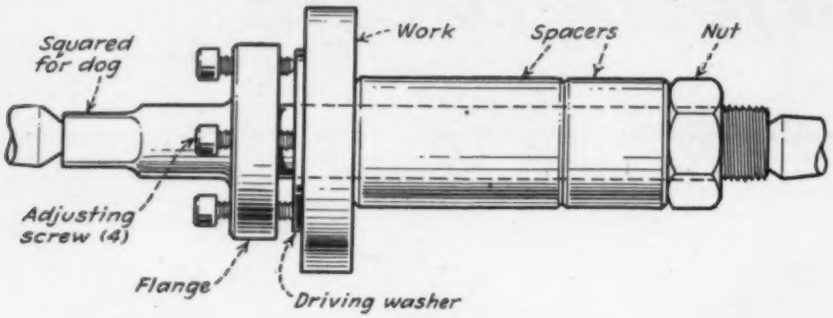


Vise Permits Fast Lathe Boring

We are running a job on a few thousand bronze castings which require a bore of 2.000 + .001 — .000 by 1 in. deep from a cored hole. A very simple setup was made by using a standard drill vise strapped to a face of the turret of a Foster turret lathe. The boring bar is held short in a collet and is provided with a carbide toolbit. The work is placed in the vise and banked against the capscrews holding the vise to the turret; the vise is tightened and power feed is applied. This method eliminates the need for jigging in other types of equipment and allows the machine spindle to run continuously. With it we can bore two pieces a minute. *Laurence L. Hausman, Merrick, L. I., N. Y.*



Radius Gage—A thin strip of metal with quarter-round notches of different radii ground in makes a handy tool for checking fillets and rounds in various work, as in dressing grinding wheels or in checking form cutters, for example. The cut should be well relieved to provide a sharp edge for accurate inspection.

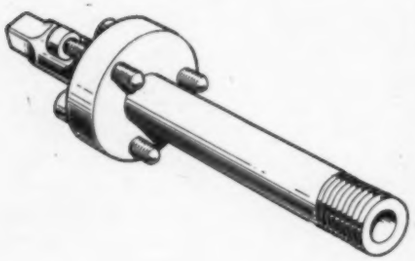


Mandrel Squares Thin Blanks

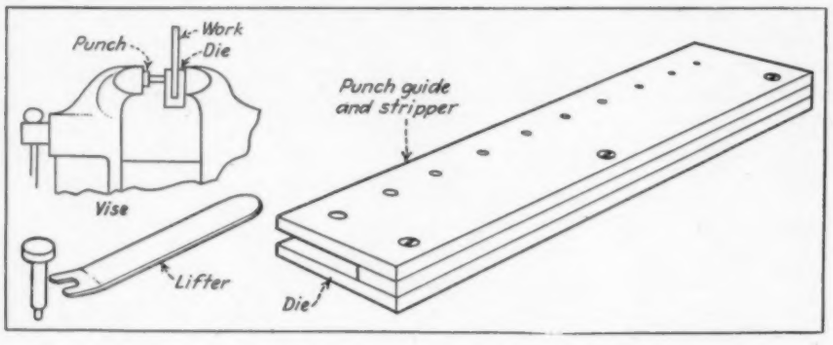
Gear blanks, die parts, special washers and similar work requiring a careful turning job concentric with the center hole are usually chucked on tapered mandrels between centers in a lathe. Workpieces thinner than the hole diameter have so little longitudinal guidance that they are easily cocked a few thousandths and the resulting O.D. and faces will not be square with the hole.

One way to prevent this is by using a mandrel equipped with a permanent flange at the thick end of the taper which carries three or four longitudinal screws. Now, the work is pressed on the mandrel until it seats as before, and while turning slowly (by hand) between centers, it is checked with a dial indicator. The screws, then, can be brought against the back face of the work in any combination to square up the piece.

A similar method with even less chance for error employs a flanged, parallel (no taper) mandrel with which the work (a slip fit) is squared entirely with the screws, and held firmly with spacers and a large nut which screws on the opposite end of the mandrel from the flange. *Donald Campbell, Cincinnati, Ohio.*

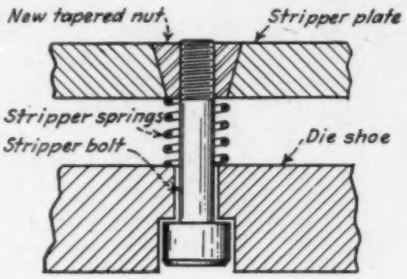


Axial screws true up thin work

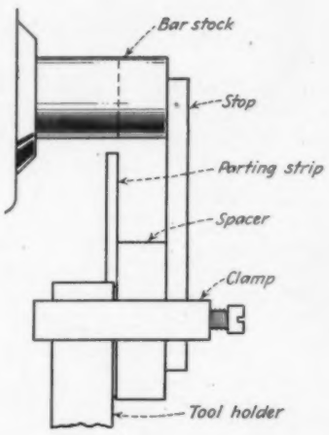


Piercing Die Used in Vise

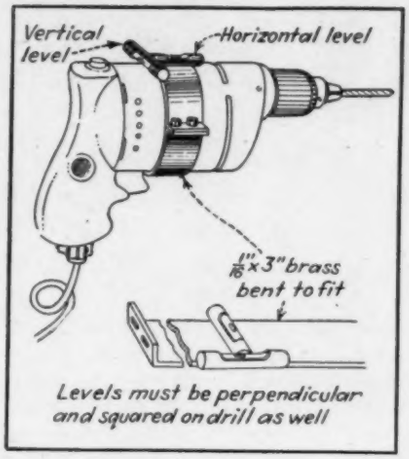
Consisting of a set of hardened drill-rod punches, die and stripper plate to receive these assorted punches, and a punch lifter, this outfit furnishes a handy way of perforating sheet and plate up to ⅛ in. thick. Work is laid out, and prick punched or drilled to a very small pilot size and slipped into the die over the appropriate hole. The punch finds the indentation in the work because it is equipped with a pilot seat, and the assembly is placed in a vise for punching. The pry bar retracts the punch while the punch guide serves to strip the work from the punch. *Gustav A. Soderberg, Ronneholmsvagen, Sweden.*



Saving Stripped Threads—Through tapped holes in large and expensive components like press die parts which have been damaged can be repaired. Enlarging the holes, and therefore the bolts, may be impossible. Tapped bushings could be screwed into enlarged holes, keeping the same bolt size but here is an easier way. Drill out the old threads and taper ream the holes well oversize with a very gradual taper. Turn up some standard hex nuts in a lathe to the same taper and drive them into the new holes so the force of the bolt will seat the new nuts more tightly. This method has been found very effective in repairing die stripper plates. *Eugene W. Dunlap, St. Louis, Missouri.*



Cut-off Stop—Lathe cutting off in production, as with bushings or tubular parts, for instance, is a natural for this simple stop finger which is clipped over the standard cut-off tool. All you need is a C-clamp and some small scraps and shim stock. *Sam Bendick, Brooklyn, N. Y.*



Spirit Level "Tee" Guides Hand Drill

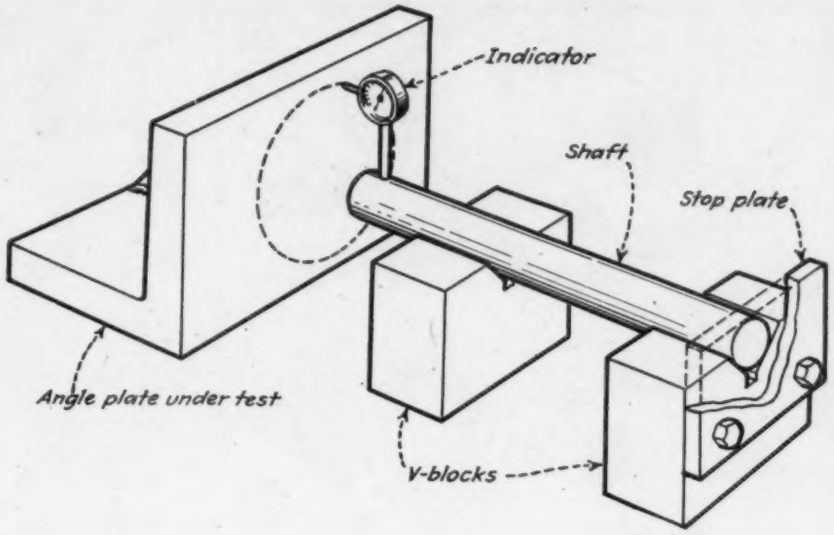
Square, perpendicular holes with a portable electric drill are practically impossible to obtain. The major difficulty (aside from steadiness of hand) is the impossibility of even eye-checking along two axes simultaneously.

This device takes the place of another man because it watches one axis for you while you watch the other one, enabling you to view the squareness of the drill in two perpendicular planes at the same time. Its only limitation is that the work must be either horizontal or vertical.

The two levels are fastened to the drill with one along the top surface parallel with the spindle, and the other fastened to the first in the same plane but perpendicularly and with the glass set to show the bubble when the drill is held in a vertical position. When drilling into vertical surfaces, you look down on the drill and watch the lateral squareness and at the same time watch the longitudinal level to get the vertical squareness. When drilling vertical holes (into horizontal surfaces), you hold the drill away from you so you can look at it from the side and observe the side to side squareness and still see the transverse level which gives you the to and away squareness.

Either cased levels or glass spirit tubes (with a shop-made case) can be used. The attachment consists of a belt, easily attached and removed to which the two levels are soldered. *Edwin A. Hoppe, Chicago, Illinois.*

Editor's Note: War surplus outlets now have small levels in oxidized brass cases with drilled mounting lugs ready to screw on.



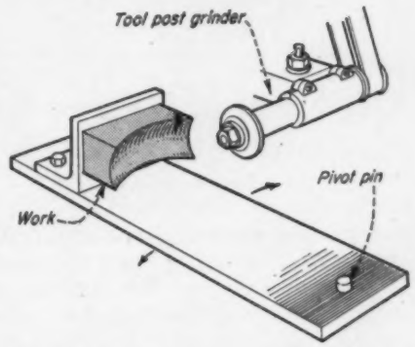
Indicator Tests Right Angles

A rectilinear block which has been ground all over can be tested by placing it on a surface plate against a straightedge or parallel temporarily fastened thereto, and mounting a dial indicator to bear against the same vertical surface of the work (as near the top as practical) which is in contact with the straightedge. Parallelism of opposite faces and squareness with adjacent faces are now thoroughly checked by turning the work through the 24 possible different positions and tabulating the results.

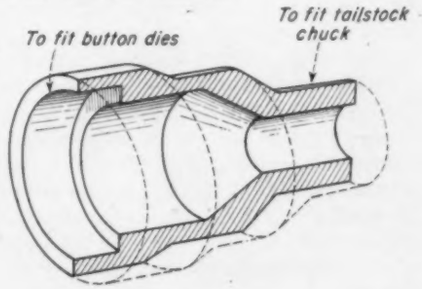
When it is desired to check a single right angle, like an angle plate, for instance, as in the example illustrated, a dial gage mounted on a ground shaft supported on V-blocks can be rotated against the vertical surface (with all elements on a surface plate) taking readings at the top and bottom positions.

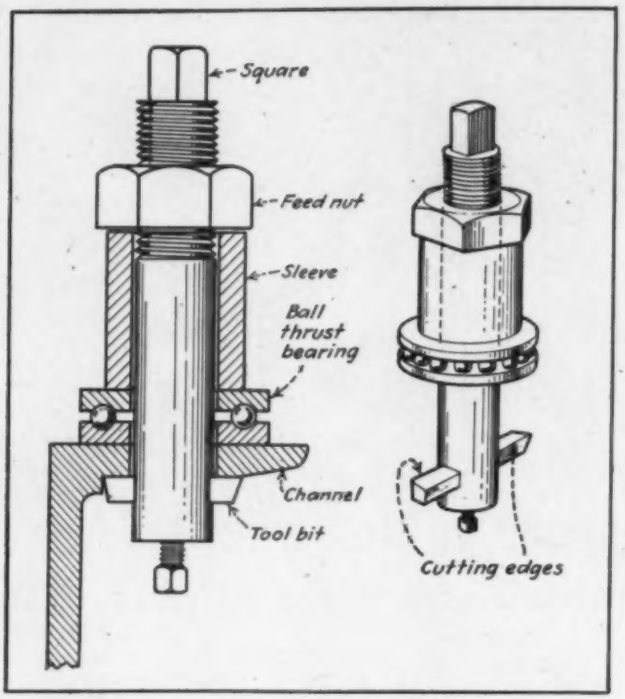
Both these methods require no squares or comparators, but the second method requires an accurate rod and V-block setup. *Gerhard Wenke, Los Angeles, California.*

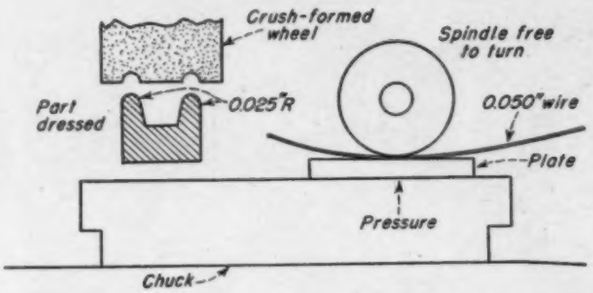
Die Holder—Fitting in the tailstock chuck of a lathe, or on a suitable rod held in the tailstock, this button die holder permits fast and accurate threading of small work. Back gears and power feed of correct pitch can be used when the tailstock is coupled to the carriage, or the die can be keyed to slide on its rod eliminating the necessity for power feed. *Al Sobczak, Milwaukee, Wisconsin.*



Spherical Grinding — Compound concave curves of high accuracy and smoothness can be ground in parts like special ball races by mounting the work on a rotating table of some sort and arranging a toolpost grinder to bear on the work with the plane of the wheel passing through the center of rotation. This will give a true circular concave arc of the wheel radius, and can be outside or inside the part. Elliptical arcs, providing relief at the sides, are obtained by cocking the wheel. Short arcs of long radius can be ground most economically with a simple plate and a pivot pin arrangement like the one shown.







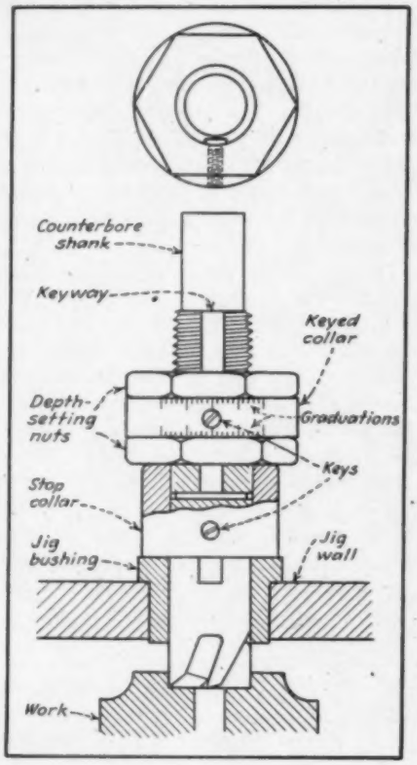
Crush Dressing—Small radii can be formed in grinding wheels by rolling in with steel wire of proper diameter. In this case, a punch required a 0.025-in. radius on each of two points, spaced a fixed distance apart. The wheel was first squared and trued, then a diamond was used to notch the wheel with two rings the correct distance apart, starting the two grooves. A piece of 0.050-in. wire was next pulled under the wheel by hand in each of the notched rings until the complete groove was formed. A plate was laid over the magnetic chuck to prevent damage. *Willet Kilbank, Gananoque, Ontario, Canada.*

Spot Facer Trues Seats

Channels, angles, columns and beams often require square seats for washers and nuts on their inner surfaces, but because of their large size and the inside location, it may be very difficult to perform the necessary spot-facing operation. This tool can be assembled in even the tightest locations and a nice flat produced even on large work.

The tool body is slipped through the hole and the bit inserted and tightened. The feed nut then takes up all the slack, bringing the bit up against the work and putting pressure on the thrust bearing. A box wrench on the squared end turns the tool while another wrench is used to advance the feed nut and make the bit bite deeper. The turning effort is applied to the bit with high efficiency as the ball bearing has very low friction and there is ample rigidity to cut squarely even on inclined surfaces. Stacks of washers or sleeves are used to make quick adjustments for different work thicknesses.

Similarly, other toolbits can be substituted in the toolholder to perform other operations. Countersinking is one obvious example. Another would be counterboring, or stepboring. When very close clearance is encountered, a socket-head setscrew should, of course, be used. *E. L. Clark, Racine, Wisconsin.*



Jig Counterbore Has Micrometer Non-Slip Depth Adjustment

Accurate jig counterboring requires an adjustable depth-setting device which is not only positive but also capable of easy adjustment. The conventional double nut method is positive enough but suffers from the difficulty in holding one nut stationary on the threaded tool body while tightening the second nut. No matter how the components are held, it seems, final locking always disturbs the setting by an amount depending on the pitch of the thread, because friction always causes some relative angular movement between the first nut and the screw.

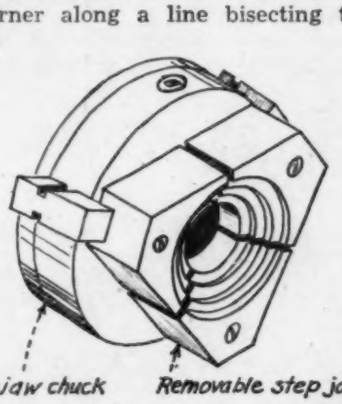
A non-rotating, keyed spacer-sleeve interposed between the nuts prevents the trouble because the frictional torque is expended against the wall of the keyway and not on the first nut. Use of the spacer affords opportunity for a further refinement if desired. After the first trial setting of the jig counterbore, a cut should be taken and the result measured. Any discrepancy is then applied as a correction. This corrective adjustment can be foolproof if the barrel of the spacer is graduated in thousandths (only a small sector is necessary as one of the six points of the nut will always be in range). This will be simplified if the tool and nuts are made with 16 2/3 threads per inch. Then, one revolution will be an advance of 0.060 in. and 1/6 revolution (count the flats) will be 0.010 in., of course. *H. Moore, Leeds, England.*

Wide Step-Jaws Hold Thin Rings and Tubes

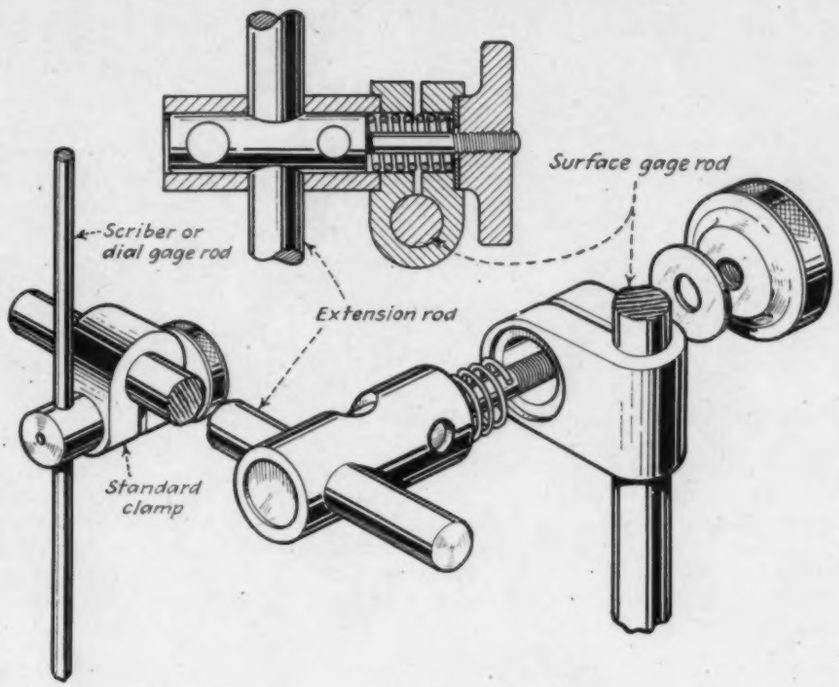
Fitting piston rings to new pistons in production is one thing but re-servicing old equipment requires entirely different technique. Both ring thickness and width, as well as diameter may vary.

There are several ways to chuck work of this nature, of course. The draw-in collet step-chuck is common for lathes equipped with a collet attachment and sometimes special wide jaws are made or purchased for a standard 3-jaw chuck.

This method, particularly suitable to larger work, has many advantages. These detachable jaws are easy to make and are quick to mount and demount without removing the whole chuck or removing the chuck jaws proper. They have greater holding power than a collet-type step-chuck, too. To make them, blocks of metal (steel or brass, depending on the work to be done) are sawed with 120° included angles at one corner of each so they will fit together at a common point. A slot is milled along one face of each block from the 120° corner along a line bisecting this angle. The slot is made just the width of the standard chuck jaw. Blocks are then fitted to the chuck, and drilled, tapped and assembled, one to each jaw with a machine screw. It is then easy to turn and bore the blocks to any desired set of diameters, and of course, these diameters can be re-bored at a later date when required.



We built a set of these jaws to handle a certain piston ring production problem and the results were excellent. The steps were bored 2, 3, 4 and 5 in. in diameter to take the rings we were using, and the steps were shallow enough to permit facing cuts on the smallest ring without difficulty. *Robert Mawson, Providence, R. I.*



Universal Clamp Extends Surface Gage Applications

An extra universal swivel clamp and assorted pieces of drillrod can give many new uses for the dial test stand, or surface gage. My surface gage standard clamp holds the 5/32-in. scriber rod on the ⅜-in. gage rod, and that's all. The extra clamp fits on the gage rod, but is capable of clamping on 5/32, 5/16, and ⅜-in. diameter rods.

The extra joint allows the surface gage to reach around many more obstructions than otherwise possible, to reach inner surfaces of dies, special castings, etc., and by similar token, permits attachment of a standard dial indicator with whatever rods are required.

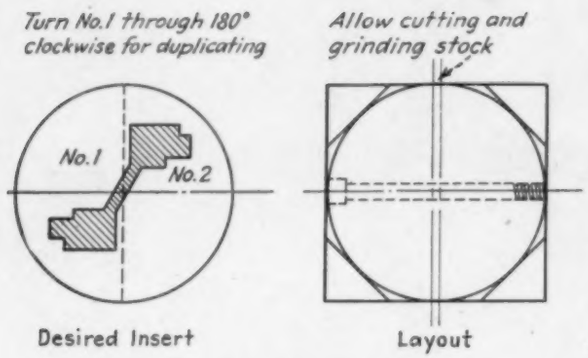
What's more, the two clamps mounted along the same piece of ⅜-in. drillrod, and provided with two scribers, or a scriber and a pencil makes as handy a trammel (of unlimited range) as you could ask for.

The clamp has six parts. The body is a piece of ⅝-in. rod, turned down to a ¼ in. for about half its length and threaded. A piece of steel tube is fitted over the body, and the two together are cross-drilled with three (or more) assorted holes to fit various scriber-rod diameters. A split block with 90° non-intersecting holes, one of which is ⅜ in. in diameter (to fit the surface gage rod) and the other is bored and counterbored to the tube inside and outside diameters, respectively. That makes three of the six. The others are the spring, the washer and the knurled nut.

When the nut is tightened on the body screw, the extension rod is put in shear between the body and the sleeve, while the sleeve, pressing against split block, tightens against the surface gage rod. All parts should be hardened for long life. The spring is not vital to the device, but it takes up the slack when the clamp is loose, and prevents the components from working apart when not in use, and makes adjusting easier.

Incidentally, this is about the handiest and simplest type of clamp when any two rods have to be adjustably fastened together whatever the purpose.

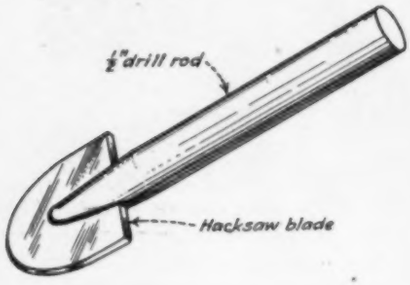
Some gaging operations involving extreme overhangs or extensions can make use of two gage bases, making a "goal-post" setup for more stability. Here is one application where this clamp or clamps will really shine. *Homer Tate, Chicago, Illinois.*



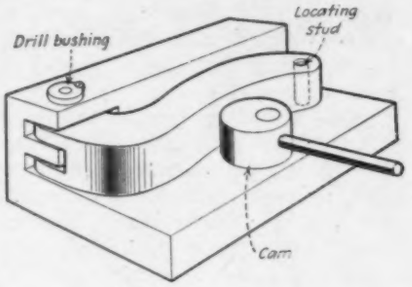
Making a Symmetrical Die Casting Die Cavity

As multiple cavity dies are common practice in die casting, means for duplicating a master are usually available. Often, another frequently met situation can be hastened and improved by an unconventional use of the duplicator.

Occasionally, large single cavities will come along where identical areas are repeated in different orientation as elements of the same cavity. When this occurs, as in the present example, the die insert can be split in advance into as many portions as necessary and reassembled with dowels and screws prior to any machining. The first region is machined after the exterior contours of the cavity insert are finished. Then the block is taken apart and the other element(s) rearranged in proper orientation for duplication. *Robert J. Lachow, Cleveland, Ohio.*



Form Cutters—Old hacksaw blades, welded into steel shanks, retempered and ground, make handy and inexpensive 2-flute tools for wood, plastic and light metal cutting and pattern making. Power hacksaw blade stock is thick enough for a lot of work, yet thin enough to allow grinding from the solid to unusual forms and profiles when "standard" form cutters would be too expensive in proportion to the job. *C. Clarke, Toronto, Ontario, Canada.*



Cam Jig—Odd-shaped links requiring end holes a fixed distance apart have been drilled quickly with this jig. The part comes with one hole finished so the part is placed over a locating stud and brought against the side of the jig with a cam wedge. This places the clevis to be drilled under the drill bushing in the correct position and holds it securely. *Donald Campbell, Cincinnati, Ohio.*

Emergency Taps can be made from setscrews simply by tapering the ends and grinding in several flutes. These screws (also most socket capscrews) are made of hardened steel.

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How to Enter—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St., New York 18, N. Y.

NEWS OF METALWORKING

Metal Show Draws 372 Exhibitors at Chicago

CHICAGO—The 29th annual National Metal Exposition occupied almost all of the 240,000 sq. ft. of exhibit space available at the International Ampitheatre.

More than 20,000 different metals, machines and other devices were displayed by 372 exhibitors. Sponsoring organizations were the American Society for Metals, the American Institute of Mining & Metallurgical Engineers, the American Welding Society, and the American Industrial Radium & X-Ray Society. The National Metal Congress, held concurrently with the exposition, combined technical sessions of the sponsoring societies.

Heat-treating accounted for a large portion of the papers presented at the ASM sessions. Francis B. Foley, superintendent of research, The Midvale Corp., was installed as ASM president at the annual meeting. Dr. H. K. Work, director of research, Jones & Laughlin Steel Corp., was installed as vice president.

Technical sessions sponsored by the American Welding Society during its 28th annual meeting included 70 papers covering 16 classifications of welding applications and research.

Among exhibits were:

An electrically controlled automatic "Flamatic" hardening machine, exhibited by The Cincinnati Milling Machine Co., permits flame hardening of parts in production quantities. Sensitive thermopile focussed on work controls uniform depth of heat penetration. Hardening temperature range is 800-1800 F. and any value can be held within ± 5 F. Quenching medium is held within 5 F. of required point within range of 90-150 F. by means of a heat exchanger.

The Budd Co. introduced an electronic induction heater for internal or external surfaces, or both. This 20-kw. unit operates at 500-kw. frequency. A new low-cost 2-kw. induction heating unit for bench mounting was shown by Scientific Electric Div. of "S" Corrugated Quenched Gap Co.

Four new units were displayed by Tocco Div. of The Ohio Crankshaft Co. A 750-watt "Toccotron" bench-type radio-frequency induction heater is intended primarily for soldering and silver-brazing operations. The 7½-kw. "Toccotron" operates at nominal frequency of 3 million cycles per sec. for heating small-diameter parts. Also shown was a vertical electronically controlled "Toccotrol" fixture for progressive hardening of round shafts and similar parts.

Officers installed by the ASM include (left) Francis B. Foley as president and Dr. Harold K. Work as vice president. Annual meeting of the society was held at the Palmer House in Chicago in conjunction with Metal Show

A salt-bath furnace displayed by A. F. Holden Co. features electrodes formed by molten pools of metal. This furnace can operate up to 2350 F.

Sunbeam Stewart Industrial Furnace Div. of Sunbeam Corp. showed a reverse-flow recirculating furnace designed for closer temperature control, more uniform heating (1250 F. max.) throughout the work and greater production. This unit has a 30-in. dia., 36-in. deep basket.

Hevi Duty Electric Co. exhibited a "Treet-All" multi-purpose electric furnace capable of performing most heat-treating operations involving temperatures up to 1850 F. Carburizing, dry cyaniding and scale-free, non-decarburized hardening operations can be handled. Also shown was an electric "Temp-Rite" furnace suitable for temperatures up to 1250 F., and a small-capacity "Atmo-Gen" atmosphere generator. A small display model of a Lindberg-Fisher electric induction furnace equipped for continuously casting aluminum chain was shown by Lindberg Engineering Co.

Among heat-treating supplies on exhibit was "Perliton W" water-soluble liquid carburizer developed by E. F. Houghton & Co. This material provides a deep case (up to 0.035-in. in 3 hr.) at 1575 F., and retains full carburizing value with normal production drag-out.

Surface Combustion Corp. showed a dew-point recorder to aid in obtaining closer control of effects of water vapor in all types of furnaces using gaseous atmospheres. This organization also announced a new homogenous carburizing process for raising the carbon content of steel strip uniformly. It permits parts to be shaped from easily handled low carbon steels, and then adding necessary carbon to the steel analysis. Wheelco Instrument Co. displayed a new "Capacilog" for measurement, indicating, control and recording operations.

Leeds & Northrup Co. exhibited a "Speedomax" high-speed indicator for logging thermocouple temperatures rapidly and a new air-fuel ratio controller. "Electronik" mercury switch controllers and proportioning controllers of improved design were exhibited by Brown Instrument Div. of Minneapolis-Honeywell Regulator Co. An "Infi-Trol" unit for controlling temperatures of electric furnaces was announced by K. H. Huffert Co. The Claud S. Gordon Co. showed a "XacTline" straight-line temperature control unit for use with conventional millivoltmeter and potentiometer-type

pyrometer controllers.

The Foxboro Co. exhibited a "Dynalog" controller of thermocouples. Dustproof cases for Series 500 recording gages and thermocouples were announced by The Bristol Co.

Hauck Mfg. Co. displayed a self-cleaning metering oil valve for precision control of flow to oil burners. Several improved gas burners for furnaces and ovens were shown by Bryant Heater Co. New gas-air mixers for proportional mixing of gas with air were exhibited by Gas Appliance Service, Inc., and by Eclipse Fuel Engineering Co.

Air Reduction Co. exhibited both manual and automatic machines for "Heliwelding" with inert gas shielded arc.

A "Unionmelt" automatic flexible welder for manual submerged melt welding was demonstrated by The Linde Air Products Co. The welding nozzle of this unit is at the end of a 20-ft. hose through which both the electrode and the granulated flux are delivered.

Arc Welders Shown

General Electric Co. displayed a 00-amp. dc arc welder for single-operator applications, featuring reduced weight, improved welding characteristics and single dial control. A line of transformer type arc welders having no moving parts was displayed by Harnischfeger Corp.

Westinghouse Electric Corp. announced a 65-volt transformer-type arc welder for industrial applications and made in 200- to 500-amp. sizes. Westinghouse also displayed automatic welding equipment for submerged melt welding with granular flux.

The Lincoln Electric Co. exhibited transformer-type arc welders equipped with "Arc Booster" units and claimed to be suitable for overhead welds. Also shown was a manual adaptation of the "Lincolnweld" for welding under granular flux.

The Hobart Brothers Co. displayed transformer-type industrial arc welders available in 300- and 500-amp. sizes, a large dc-ac welder-generator combination set made in 6- and 12-kw. sizes, and a new ac arc welder and power unit of 5-kw. capacity.

National Cylinder Gas Co. demonstrated a "Shape-O-Matic" portable gas cutting machine. Unit has a 32-in. arm and carriage is free to pivot 360 deg. This company also introduced the "FerroJet" method for cutting high-alloy stainless steel and cast iron with oxyacetylene.

Among new materials shown were: a brass extruded cold-heading wire announced by Scovill Mfg. Co.; "Electreat" induction heat-treated cold finished steel made by Jones & Laughlin Steel Corp.; "Vasco Supreme" high-speed steel made by Vanadium-Alloys Steel Co., and 18-8 Stainless Steel Paste offered by Charles Hardy, Inc. to be applied to surfaces in the form of paint.

Retiring president of ASM, Alfred L. Boegehold presided at annual meeting

A precision casting process announced by the Engineering Castings Div. of American Brake Shoe Co. produces iron castings in carbon and alloyed grades to accurate dimensions.

The "Electromagnetic Pump," developed by Ajax Engineering Co. for casting aluminum alloys in either permanent metal molds or in sand molds, was shown for pouring castings weighing ¼ to 20 lb.

A large 600-shot per hr. automatic die-casting machine for lead, tin and zinc alloys capable of injecting 25- to 100-cu. in. per shot was exhibited by Wickes Brothers.

700 Cycles Per Hr.

Kux Machine Co. showed a Model BA-12 die-casting machine capable of 700 cycles per hr. Castings weighing up to 5 lb. in zinc can be produced. This company also exhibited an injection die-casting pressure multiplier.

Photographs of a 10-million volt portable Betatron for industrial radiographic inspection of metals to 15-in. thick were exhibited by General Electric X-Ray Co. North American Phillips Co. displayed a Geiger Counter X-Ray Spectrometer for fluorescence analysis of solids, powders and liquids. The Kelly-Koett Mfg. Co. showed a "Keleket" Geiger Muller detector.

Sperry Products, Inc., showed an angle searching unit for use with the Sperry "Reflectoscope," to locate defects in welds or walls of uniform or tapered thickness. Also exhibited was a new "Reflectogage" for measuring thickness of parts up to 4-in. A similar instrument, the "Sonigage" was exhibited by Magnaflux Corp.

The "Microformer" stress-strain recorder, exhibited by Southwark Div. of Baldwin Locomotive Works, is claimed to improve the accuracy of readings from tension and compression testing machines. A new PH-60 universal hydraulic testing machine was exhibited by Riehle Testing Machines, Div. of American Machine & Metals, Inc.

The Model 460 "Cutmatic" abrasive cutting machine displayed by Andrew C. Campbell Div., American Chain & Cable Co., can be arranged for semi-automatic or full-automatic operation on bar stock up to 6-in. dia.

Porter-McLeod Machine Tool Co. showed an hydraulic glazing and mirror finishing machine for polishing flat parts.

Packer Machine Co. showed a multiple-head automatic polishing machine equipped with new universal buffing and polishing heads equipped to use endless abrasive belts or standard buffing and polishing wheels. Udylite Corp. displayed a novel oscillating polishing head for automatic machines.

Chip Breaker Grinder

Hammond Machinery Builders, Inc. showed a model C-4 chip breaker grinder for single-point tools, and two abrasive grinding and polishing machines. The Model C-6 belt grinder-polisher displayed by Porter-Cable Machine Co. is designed for dry belt finishing of contoured surfaces. The "Bright Finisher" belt grinding and polishing machine exhibited by Crown Rheostat & Supply Co. features flexible work-contact wheels.

A 55-ton 2100 stroke per min., open-back inclinable punch press was exhibited by Diamond Machine Tool Co. Pines Engineering Co. displayed a special machine for facing and chamfering both ends of ½-in. pipe at a rate of 1085 pieces per hr.

Honan-Crane Corp. displayed the "Houdaille" sediment conveyor for settling tanks. This company also showed a new mobile coolant filter for cleaning sumps.

A small parts washer with rotating rack for basket located in tank was shown by Detrex Corp. A low-priced hand-dip type vapor degreaser was shown by Phillips Mfg. Co. Listed as Model 24, this unit has a 24- x 24-in. tank and 36-in. vapor depth. Also exhibited was a new Phillips "Rotomatic" vapor degreaser.

The Udylite Corp. exhibited the "Junior" fully automatic plating machine designed for handling 100 racks per hr. Koch Industrial Equipment displayed an operating model of a novel cleaning and finishing unit in which an endless metal strip with suitable clips carries the work to and from cleaning, plating, spray painting or other stations.

Gaging Business

Nonferrous Situation Eases

Sheet aluminum is plentiful, but demand has increased and deliveries have lengthened. Aluminum is being used by many companies to take the place of steel while the latter is in short supply.

Tin and lead are relatively easy. Despite heavier purchases of lead to provide a cushion for winter operations, the supply has not been overtaxed. Imports of scrap lead from Japan have aided the situation.

Castings Cause Less Anxiety

Castings continue to cause less anxiety than a few months ago. Pig iron is not short enough to curtail much foundry production, but foundries in general will welcome the day when pig iron allocations increase and less high-priced scrap will have to be used. Such a change also would improve the quality of castings.

Tractor Demand Unabated

Makers of tractors and of earth-moving equipment see ahead no cessation in the extraordinary demand for their products. Backlogs average 12 months. Incoming orders have been so great that high production has not made even a dent in the backlogs. More business is anticipated in the first half of 1948 than in the second half of this year. One company has lost output of 8,000 tractors this year on account of strikes.

Users To Get More Steel

Continued high output of steel mills should permit users shortly to receive larger tonnages against orders already on the books. Actual steel allotments in first half of next year promise to be only a little larger than the 1947 volume. Nevertheless shipments will more nearly match allocations.

Carbon sheets are not likely to show any improvement this quarter. Carbon strip, by contrast, appears less stringent, but seems apt to tighten again about the end of the year.

Plate And Pipe To Be Tight

Plate and pipe will be difficult to get in 1948 just as in 1947. Structural steel, wire, nails and hot-rolled bars, all of which are scarce now, should be available to satisfy all requirements next year. It may, though, be a tight squeeze. Cold bars and alloys are not too hard to get. Stainless and other alloy tonnages are being shipped at a fairly lively rate. They seem sluggish only by comparison with the normal activity in carbon steel.

Car Building Still Lags

Freight car building is not yet up to expectations. New cars being produced monthly total about 7000-8000. The goal since the year's beginning has been 10,000 a month. Meanwhile the situation as to availability of cars has seriously deteriorated and all sorts of pressures are being exerted by big companies to secure enough cars for their minimum needs. General American Transportation Corp., operating some 45,000 tank cars, is said to have every car it owns tied up on lease.

Metalworking At Peak

In capital equipment and consumer goods, the metalworking industries are producing at an all-time high except for the war years.

Though lack of sufficient materials prevents many companies from reaching an even loftier level, scarcity of labor is a brake upon further expansion by others. Backlogs in general are large enough to insure continuation of current record operations far into next year.

The only fear is that food prices might get so out of hand that purchases of other commodities by consumers might have to be seriously curtailed. This appears to be merely a possibility rather than a probability.

Machine Tool Business Up

Machine tool business has been very active the past month, with a liberal volume of orders placed and shipments somewhat better than the summer average.

Considerable buying is under way in the automotive and farm equipment industries. Tooling for new automatic transmission has provided a fresh batch of machine tool orders.

The industry continues to reflect the optimism generated by the recent Machine Tool Show, the full benefits from which cannot be measured for six months.

Machine tool builders expect that export business next year will be at least equal to the pre-war average of 20%, despite the dollar shortage abroad.

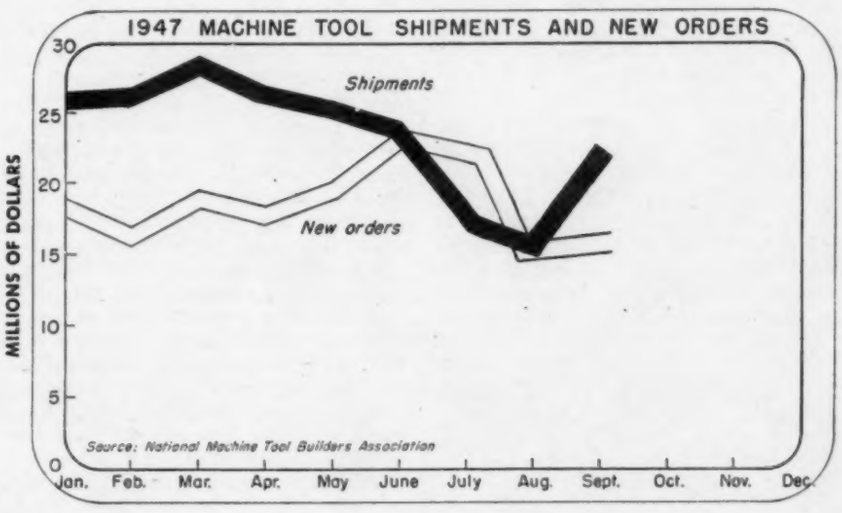
1947 Machine Tool Production
(Thousands of Dollars)

Month	Shipments	New Orders	Cancellations	Unfilled Orders
Sept. 1946	$25,468	$23,088	$3,048	$179,797
1947				
Jan.	26,542	18,991	1,503	154,760
Feb.	26,765	16,780	1,760	146,145
Mar.	29,012	19,509	1,436	137,175
Apr.	26,857	18,220	1,820	128,830
May	25,791	20,018	4,989	121,155
June	24,383	23,810	2,005	120,268
July	16,843	22,227	1,243	124,155
Aug.	16,348	16,007	976	122,097
Sept.	22,520p	16,251p	1,138p	117,701p
9 month Total	$215,061	$171,813	$16,870	
Foreign				
Sept. 1946	4,907	4,892	423	53,348
1947				
Jan.	7,176	5,573	266	46,370
Feb.	6,085	4,152	972	43,787
Mar.	7,695	5,268	347	40,999
Apr.	6,365	4,896	210	39,294
May	6,244	4,242	225	37,610
June	5,680	4,505	315	36,766
July	4,761	4,570	369	35,782
Aug.	4,676	3,847	291	34,417
Sept.	5,950p	3,707p	196p	32,141p
9 month Total	$54,632	$40,760	$3,191	

p—preliminary

Note: September figures for unfilled orders were compiled too early for business transacted at the recent Machine Tool show to be reflected.

SOURCE: National Machine Tool Builders Association.



Hosiery Concerns Face U. S. Charge

WASHINGTON — The Justice Department is seeking through an anti-trust suit filed this week in U. S. District Court, New York, the separation of two corporations charged with monopoly and conspiracy in restraint of trade in the full-fashioned hosiery and hosiery machinery fields.

The government charges that the Textile Machine Works and Berkshire Knitting Mills, both corporations of Wyomissing, Pa., and certain of their officers and directors, have been engaged in a program designed to strengthen and insure the domination of each company in its respective field and to prevent small hosiery mill operators from obtaining second-hand machines which could produce lower-priced stockings and compete with the new higher-gage machines manufactured by the Textile Machine Works.

Naming Berkshire the largest producer of full-fashioned hosiery, John F. Sonnett, assistant attorney general in charge of the anti-trust division, claims "a virtual monoply of the manufacture of machines has been acquired by the Textile Machine Works, which has about 85% of the nation's production facilities for full-fashioned hosiery machines. Berkshire has twice as many machines as any other hosiery manufacturer."

Foreign Briefs

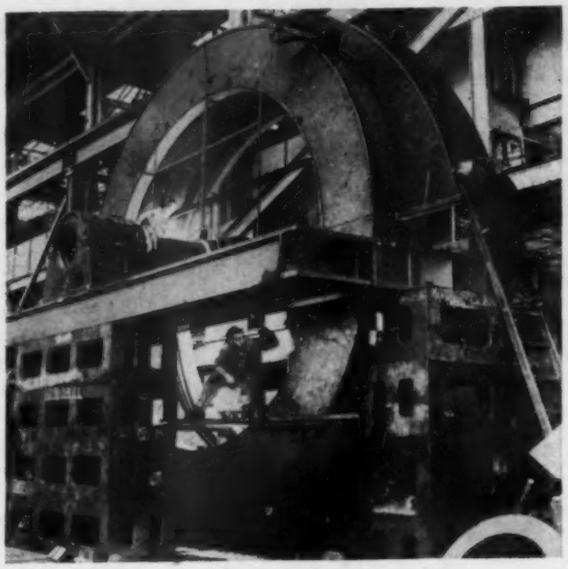
(McGraw-Hill World News)

NEW DELHI, INDIA—India's many plans for expansion of its metalworking industries are hamstrug by a steadily declining steel production which also has almost halted many construction projects.

Tata Iron & Steel, the country's major producer, revealed recently that output for the 1946-1947 term was below 1942 levels. Steel Corp. of Bengal, second-place producer, showed a greater drop.

Aiming at the eventual establishment in India of a broad internal combustion engine industry, the government Council of Scientific & Industrial Research has decided to found a National Internal Combustion Engineering Laboratory. The project is a reflection of the fact that to date India does not have even an internal combustion engine factory.

VANCOUVER, B. C. — Radiography is being used extensively by the Research Council to examine castings produced in the experimental foundry stations.



Synchronous Mill Motor, weighing 110 tons, will produce 4,000 hp. when completed at the Schenectady Works, General Electric Co. It will drive a new Mesta Machine Co. mill in the Tennessee Coal, Iron & Railroad Co. plant, Fairfield, Ala.

Standardization Necessary to Cut Rising Costs, F. R. Lack Tells ASA

NEW YORK—Standards for mechanical and consumer goods are an important stabilizer of costs in a period of rising prices, declared Frederick R. Lack, president of the American Standards Association. At the annual meeting Oct. 23 at the Waldorf Astoria Hotel, he enumerated several ways in which standards can be helpful:

1. When companies use standardized parts and components, these can be bought or manufactured in quantity, and their uniformity contributes to production economy.

2. Fewer items are involved, reducing:
   (a) Inventory, maintenance and repair costs
   (b) Employee training
   (c) Accounting
   (d) Development and design costs.

3. Standard parts and finished goods can be accumulated in slack periods to an extent not practical with non-standard items.

Substantial growth and achievement during the past year were reported by Mr. Lack. Twenty-one national organizations have affiliated with the ASA, raising the total to 107. Since the previous annual meeting, 87 new or revised standards have been approved. But to meet its growing responsibilities, the ASA plans to broaden its activities, because it is freely admitted that the 850 American standards on the books are only a small selection of specifications and codes which are essential tools of American industry and commerce. These plans will require greater financial support of the association.

Officers elected for 1948 are:

President—Frederick R. Lack, vice president and director, Western Electric Co., in charge of radio division.

Vice President—George H. Taber, Jr., executive vice president, Sinclair Refining Co.

Chairman, Standards Council—E. C. Crittenden, associate director, National Bureau of Standards.

Vice Chairman, Standards Council—L. F. Adams of General Electric Co.

Principal speaker at the annual meeting was Edward P. Warner, President of the Council, International Civil Aviation Organization. When the first aeronautic safety code was established in 1922, total traffic of the world's airlines in that year was less than that of a single day in 1947. Currently between 20 and 40% of world air travel is international in character; the Atlantic passengers in 1947 will approximate 200,000 persons. To establish uniformity in air traffic regulations, 43 countries now subscribe to the convention that gave birth to ICAO. This policy, which sets up objectives rather than hard and fast rules, is covered in a manual that currently is of 110 pages.

Packaging Machinery Unit Reelects G. W. von Hofe

SPRINGFIELD, MASS.—George W. von Hofe, president of the New Jersey Machine Corp., Hoboken, N. J., was reelected president of the Packaging Machinery Manufacturers Institute.

Vice presidents elected were: John P. Corley, Miller Wrapping & Sealing Machine Co., Chicago, and Howard R. Stewart, Economic Machinery Co., Worcester, Mass.

Detroit

TOOLING BUSINESS INCREASES WORKING HOURS... KAISER-FRAZER WIPES OUT LOSS, SHOWS PROFIT... AUTO BACKLOG IS UNCHANGED

Tooling business in the Detroit area is showing a ripple or two on top of its lately stagnant surface. The tool and die shops, which have worked so long on 40-hour weeks that they almost forgot there was such a thing as overtime, are scheduled at an average of more than 45 hours a week today, and may modestly improve that pace soon.

The reason, of course, is the appearance of the comparatively quiet tooling programs which generally mark the auto industry's plans to switch to 1948 models. Actually, these are not large, and the great majority of them, by themselves, would do no more than add an hour or two onto the average work-week of Detroit's 9,000-odd toolmakers.

Ford Program Substantial

The Ford program for one, however, is most substantial—even the segment which has come to rest in the Detroit shops and not gone outside. There also appears to be some notable engine revamping work coming through from some of the General Motors divisions, which is serving to increase the total activity.

As the score stands, Packard has already announced its 1948's. Hudson has gone into production on them, and will be selling them in all markets by the end of the year. Nash is on the verge of announcement of a face-lifted 1948. Studebaker will follow suit soon after.

Willys made a big mid-October splash in the automotive press with the unveiling of a smart sports phaeton, tentatively named the Jeepster—a low, racy job intended for the youth market, somewhat reminiscent of European lines, and built on the jeep chassis. This will come into production this winter. Further on the Willys docket is a deluxe station sedan, and later—a year from now—a sedan, possibly in both 2-door and 4-door models. These passenger cars, like the deluxe station wagon, will carry a 70 hp. engine.

Final Figures in Doubt

DETROIT—Automobile manufacturers, running hand to mouth on steel, decide from week to week on whether to operate in the succeeding period.

As the result of this, the final production figure for 1947 for the industry is still in doubt.

Willys-Overland Presents preview of a new convertible-type sport passenger car, designed "to meet the demands of the youth of America." The two-door, five-passenger model will be produced late in 1948 or early 1949, according to officials. A new all-steel passenger station wagon was also exhibited

200,000 Units Willys' Goal

Willys, incidentally, is setting its sights on output of 200,000 units during 1948, up about 65% from the 120,000 completions scheduled this year.

Kaiser-Frazer has some ambitious plans which may translate into volume business for machine tool makers. The company plans to set up a $10-million engine plant. At present the company's engines are built in facilities leased in Detroit from Continental Motors Corp.

K-F has won a grudging respect from the rest of the automobile community, once openly dubious that the newcomer would ever build automobiles. Production now is at a rate of upwards of 4,000 units per week at Willow Run, and the sights are aimed at a near term 5,000. What's more, the company is making money.

Loss Wiped Out

Third-quarter operations this year produced profits in excess of $8 million, completely obliterating the $2-million loss suffered during the preceding six months.

At the same time, competitors maintain that the Kaisers and Frazers are priced too high to meet competition. If this is true, a slackening in demand for new cars might compel rather drastic rearrangement of the company's programs.

But no slackening is looked for by autodom in the near or medium term. Output of less than 5-million cars and trucks this year will do little beyond balance out normal obsolescence for the year. In other words, postwar vehicle manufacture thus far has gained only negligibly, if at all, on the backlog of demand which still apparently exists.

Proof of that existence can be found by attempting to place a new car order. In the case of the popular price makes, delivery promises range upwards of a year. Hardly any dealer talks of deliveries inside of three months or so, although there are exceptions to that rule in some instances.

The auto industry dropped in October from the 100,000-a-week rate of the weeks earlier to a level around 80,000. The reason, once again, was steel. Shortages of flat rolled brought Chrysler operations to a very low ebb.

Castings Held Poor

Auto companies, and others, continue to complain of the quality of the castings. Some say that nothing anywhere near prewar quality is being cast, and that resultant rejections are holding up assembly line operations.

On the score of expanded operations, Graham-Paige Motors Corp. is building a lightweight stationary gasoline engine for farm and light industrial applications. The powerplant is rated at 5 hp. It is essentially the same as that used in G-P's Rototiller farm machines.

Norge Div. of Borg-Warner Corp. has gone into manufacture of another new line, a portable water cooler. It is intended where need for cold water is not continuous, as in offices, hotels, waiting rooms, hospitals, or large private homes. It is being manufactured in Norge's Chattanooga (Tenn.) plant, where refrigerator Rollator mechanisms are also built for Norge.

High Domestic Demand, Not Exports, Blamed for Shortages, Tight Spots

WASHINGTON—The gist of the report on National resources and foreign aid which Interior Secy. Krug made public recently is that the United States is "suffering from the unaccustomed inconveniences of a sudden and unprepared-for high-employment economy. The prevailing characteristic of the current economy is one of tautness."

The country is running in high gear on domestic demand alone, the report indicates, and that exports either at present of expanded levels are too small a factor in a big economy to deserve the blame for shortages and tight spots.

What the foreign aid does do, the report says, is expose the country to the impact of a number of shortages which are worldwide, some of which would not be noticeable on a domestic demand basis alone. These are: food, fertilizer, coal, steel and mechanical equipment, particularly farm machinery, freight cars and mining machinery.

Heavily condensed, here are some of the facts, as government economists see them, on some of the major tight spots in economy.

Farm machinery and tractor production this year will be at the record level of $1.2 billion, of which $275 million will be exported. Exports are particularly heavy in tractors, taking about a fifth of production.

Domestic demand would probably take larger amounts next year. Production next year will probably increase slightly, and a slight decrease in domestic deliveries would permit exports of about $375 million. In subsequent years domestic demand is expected to settle down to about $900 million, foreign at $350.

Iron and steel supply is the central bottleneck pointed to by the report. Both ingot and finished steel production is now below demand and the discrepancy is slated to increase.

New capacity of 2.5 million tons has been scheduel but "these appear to be gross, not net, increases and may be offset in whole or part by dismantlement of obsolete facilities." The report is generally reserved on expansion of capacity, pointing to the steel which would be consumed in new plants. It places more hopes on increased output from use of high-pressure air and oxygen in furnaces.

Non-ferrous metals are among the most significant scarce exhaustible resources of the U. S. On all of them except molybdenum, of which sources are ample, we are not importers. Any increased exports of fabricating capacities are in all cases adequate for considerable expanded production.

Model Atomic Power Plant is explained by Dr. Kenneth H. Kingdon in the General Electric Research Laboratory. At left is "pile" where matter is transformed into energy by splitting fissionable elements such as uranium. Dr. Kingdon holds "fuel" material in left hand. Striped rods represent control rods. A heat exchanging fluid would be pumped through pile, thence to heat exchanger on right, where water would be turned to steam. This would then be used to drive turbines in customary manner

Revision Due

WASHINGTON—A revision in Secy. Krug's report, now underway, will emphasize shortage of coking coal as a major limit on steel production.

Prevention of the export of coking quality coal and perhaps some relaxation and municipal smoke abatement laws to avoid burning of coke will be recommended to protect this short item.

Copper production domestically is now and will continue to be insufficient to satisfy U. S. demands, falling short by 1 million tons. World production in the future could, if pushed, change the present world deficit to a surplus.

Lead will be short the world over, both next year and in the future. Stocks will be exhausted by year's end and imports will be slowed by increased demand in the rest of the world.

Tin is in short supply, but by 1950 production is expected to reach a level assuring U. S. consumers unrestricted supplies.

Antimony is scarce, and the outlook is not favorable unless China reenters trade as chief world supplier.

Cadmium will continue to be short but "approximately half of the peacetime uses of the metal are not essential and could be curtailed to meet urgent export trade."

Chromium is the only one of the ferro-alloying metals which will be in short supply during the next few years. Correction of transportation shortages in Rhodesia is expected to ease the situation.

Coal is one of Europe's most critical needs for reconstruction. Present European production is at an annual rate of 455 million metric tons—of which England provided 198 million. This is about 100 million metric tons (110 million U. S. tons) less than prewar production.

To meet this deficiency, U. S. exports are expected to reach 37 million tons. Total exports, including those to Canada, will total 71 million, close to the present capacity of ports. Domestic demand of 598 million tons is expected to bring total production to 660 million tons, just short of the 1944 record of 682 million. Export demand next year is expected to mount but domestic demand is scheduled to fall.

Transportation's biggest problem is freight cars. The Krug report estimates a domestic need for some 180,000 new cars per year for the next five years. The railroads were placing orders the first half of this year at an annual rate of 130,000 cars, but this shows an easing off.

Definite Trends on Marshall Plan Indicated as Congress is Summoned

WASHINGTON — Rapid deterioration of political and economic conditions in the Marshall Plan countries of Europe has been indicated in the speed with which President Truman called a special session of Congress almost immediately following the return from Europe of Rep. Herter's study committee.

For some time the Marshall Plan has been a question mark as to how this tremendous aid program will be handled. Since the return of the congressional committee definite trends have been indicated. What the final plan will be is up to Congress, but here are a few patterns which appear to be taking form:

1. Approval of a program from $12 to $16 billion, with a strict supervision guarantee that every cent is wisely spent.

2. A special government corporation, rather than an outright appropriation, to do the job. This proposal has gained much backing inasmuch Congress would probably only appropriate something like $4 billion and the remainder would come through a government-guaranteed bond issue.

3. Closer supervision is seen possible under a corporate-type setup since European countries might protest more loudly if supervision was handled by the U.S. government directly.

4. A four-year program running from 1948 through 1951.

5. Congress will stipulate that the Marshall Plan must be accompanied by the utmost self-help among the recipient nations.

Nobody knows whether this program will put Europe back on its economic feet and prevent the entire continent from falling under the yoke of Communism. There is a strong feeling, however, that it has about a 50-50 chance of success and that it's worth the calculated risk. The alternative could easily amount to astronomical costs in military preparedness if all of Europe's resources fell under domination of the Communist ideology.

Herter committee members came back with the feeling that none of the countries visited—Italy, Greece, Turkey, Holland, Belgium, Denmark, Norway, Sweden, England, France, Austria and the U.S.-British zone of Germany—wants Communism.

There is a feeling among committee members that if Communism does triumph, Britain will be the last to fall under the Russian paw. The greatest pressures, they report, are in Greece, Italy and France.

Naturally, committee members saw a lot of things they didn't like. They resented a wide-spread impression that the United States is already committed to an elaborate aid program. And, they had trouble convincing Europeans that the United States is not a bottomless larder upon which they can draw at will.

Among the countries believed least likely to fall to the Communist beliefs are Norway, Sweden and Denmark, which have austerity programs as severe as Britain's, as well as Finland.

Belgium was found the farthest along toward recovery and France was reported showing some signs of returning to normal.

Western Germany is showing improvement under the bi-zonal occupation management, committee members feel, but it is being hampered by French resistance to restoration of industrial strength and the lack of trade with Russian-dominated Eastern Germany. Denial of jobs to Nazi party members has put many skilled artisans into executive positions where their talents are not used to the best advantage.

Simplicity of Controls and rugged construction are featured in this new tractor, produced by Super-Trac, Inc., Chicago. Tracks are used instead of rear wheels and the 6 hp. motor is air cooled

Information Sought

SEOUL, KOREA—The rehabilitation of Korean industry necessitates the import of large quantities of machinery, parts and other equipment, and the U.S. Army Military Government is now conducting a survey to determine the exact type of equipment to be ordered from the United States.

To enable the Bureau of Industry to prepare detailed procurement lists, Headquarters has informed the AMERICAN MACHINIST that it is interested in obtaining catalogues listing details, specifications and prices on industrial machinery, equipment and materials.

All catalogues, specifications and inquiries should be sent to:

Commanding General, USAMGIK, Department of Commerce, APO 235-2 c/o Postmaster, San Francisco.

Harvester Opens New Department

CHICAGO—International Harvester Co.. formally dedicated its Manufacturing Research Dept. with a tour for magazine and newspaper men, and talks by Fowler McCormick, chairman of the board, J. L. McCaffrey, president, and Merle C. Evans, manager.

The department, a radical departure from conventional production-research practice, was planned in 1944 to study and conduct manufacturing research, formulate manufacturing standards for production departments, and to study and improve Harvester manufacturing organization and management. It is not responsible for product design, development, or engineering research, but will work rather on the manufacturing problems that new designs or methods develop, particularly those affecting several manufacturing divisions.

Initial assignments for the new department are more than 235 projects, divided among plant engineering, mechanical engineering, materials handling, welding, metallurgy, finishes, inspection methods, forging, foundry, and manufacturing standards—major sub-divisions of the department. Each section, with its own head and staff, will assume responsibility for certain projects, although other sections and manufacturing divisions may be called in to assist as necessary.

Full operation and completion of equipment installation are not anticipated before last next year. Five hundred persons will be employed.

Unions Silent On Wage Stand At Conventions

JOSEPH GAMBATESE
WASHINGTON BUREAU

WASHINGTON—In one respect—important to management—last month's CIO and AFL conventions were significant for what they did not do. They did not beat the drums for another round of wage increases.

Last year, it will be recalled, the CIO plumped for "substantial wage increases." This year, both conventions shunned all talk of higher wages. They concentrated on prices and profits.

In Boston, where the CIO met, AMERICAN MACHINIST was told by a spokesman for the Steel Workers that this union's leadership is of the opinion that the "peak" has been reached in wages. (A few days later, BLS Comsr. Ewan Clague disclosed that the average weekly earnings in manufacturing plants hit a record $50.42 in mid-September. This more than doubled 1939.)

In a sense, this view is significant because steel wage increases have led the way for other major metalworking industries in recent years. Yet, it may mean little because, if there is to be a third round next spring, it will be led by the Auto or Electrical Workers or some union other than the Steel Workers.

These other unions will have to carry the ball next spring when major automobile and electrical manufacturing contracts are reopenable. The steel contracts, which run until May 1, 1949, may be reopened next April 1 as to wages. But if no adjustment is agreed upon by May 1, the present wages stand for another year. There can be no legal strike.

However, Philip Murray, president of the CIO Steel Workers, will expect steel management voluntarily to grant whatever wage increase, if any is obtained by other big unions. If steel grants another increase, Murray, of course, will try to force the same on steel fabricators, as he has in the past. But he won't insist on it in all cases, his spokesman said. Exceptions have been made in the past and will be made in the future. the union just doesn't like to announce it publicly, otherwise every employer would claim to be an exception, it was explained.

Exercising their natural functions, unions will ask for more wages next spring. There is no doubt about that. The big question is: How serious will they be about them? Will they trade a wage increase for other economic benefits?

One of the Largest banks of automatic screw machines west of the Mississippi is shown in the Aluminum and Brass division of the Harvey Machine Co., Inc., Torrance, Calif.

Sharp Cut in Strikes Attributed To Labor Law, Political Reasons

WASHINGTON—Strikes have declined 52% since the Taft-Hartley law was passed. The number of persons affected has dipped 68% in this same period.

Political reasons appear also behind this sharp decline.

In establishing Labor's Educational and Political League, the AFL hopes to match, if not outdo, the CIO's Political Action Committee now three years old.

The AFL hopes to raise almost $5 million through an increase in per capita tax for its 7,500,000 members, a possible assessment of 26 cents against each member and voluntary contributions from union treasuries.

CIO-PAC, seeking dollar contributions from its 6 million members, will raise about $2 million.

The object of both labor organizations will be to elect new members of Congress who will vote for the repeal of the Taft-Hartley law.

The Department of Justice has been investigating whether PAC activities are in violation of the law. The AFL has yet to offer a test of its program.

Statistics of the Federal Mediation and Conciliation Service show the following number of strikes in progress:

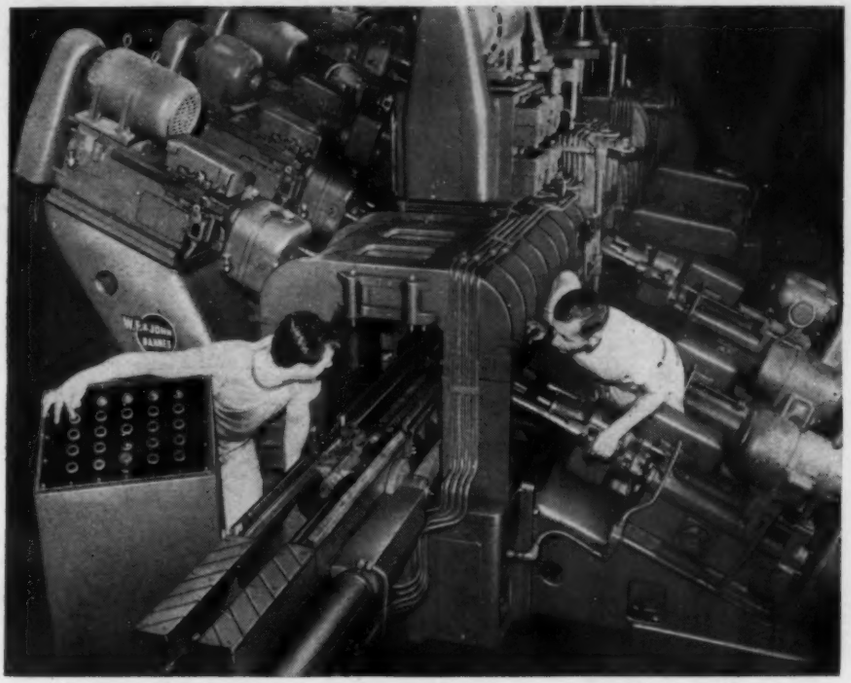
Week Ending	Strikes	Workers Involved
July 2	221	101,000
9	200	98,000
16	177	94,000
23	165	94,000
30	169	84,000
Aug. 6	163	89,000
13	156	76,000
20	147	66,000
27	154	60,000
Sept. 3	134	52,000
10	137	45,000
17	131	41,000
24	120	39,000
Oct. 1	112	35,000
8	113	34,000
15	104	32,000

Surplus Blast Furnaces, Coke Oven Sold by WAA

WASHINGTON—Two war surplus blast furnaces and a by-product coke oven at Granite City, Ill., operated during the war by the Koppers Co., Inc., have been sold by War Assets Administration to Missouri-Illinois Furnaces, Inc., a subsidiary of Koppers and the M. A. Hanna Coal Co.

Missouri-Illinois, organized two weeks ago to produce and sell coke, iron and related products, submitted a high bid of $3,255,000 for the $8-million plant. Other bidders were the Tucker Corp., Chicago, and The Fulton Iron Co., Cleveland.

The sale, contingent upon approval by the Dept. of Justice, was made on a "bid formula" established by WAA guaranteeing uninterrupted production and distribution of the same number of tons of pig iron to area users under the pattern in effect in recent years.



Seventeen Machining Operations will be performed on this drilling unit when Hudson gets rolling on a new Super-Six engine. Eight machine blocks are carried continuously on a track and are hydraulically raised and lowered into position without the help of the operator. The controls are shown on a panel at the lower left

NMTBA to Study Sales Program

CLEVELAND — The National Machine Tool Builders Association will act on a program whereby the industry will be able to sustain the drive for sales which was created at the Machine Tool Show at their Fall meeting Nov. 17-18 at Homestead Hotel, Hot Springs, Va.

H. L. Tigges of Baker Bros., Toledo, is preparing the program for the industry, which also includes the consideration of better sales methods. Tentative plans have been formulated for short college courses for machine tool sales engineers.

Tell Berna, general manager of the NMTBA, points out that a sizeable percentage of the real value of the Chicago Show is in the intelligent and diligent follow-up methods by Association members to sustain the drive, sales efforts, and interest which was generated at the Show.

Sustaining public interest in the machine tool industry is a matter of public relations, Mr. Berna believes, and is necessary if the full value of the Show is to be obtained.

ASME To Publish Monthly Applied Mechanics Review

CHICAGO—Lloyd H. Donnell, research professor of mechanics at Illinois Institute of Technology, has been named editor of the new monthly scientific journal, "Applied Mechanics Review," to be published by the American Society of Mechanical Engineers.

The journal will be devoted to criticism and review of current world literature in applied mechanics. The first issue is planned for January.

R. G. Sault Heads Metal Treaters

CHICAGO—R. G. Sault, vice president of Porter Forge & Furnace, Inc., Somerville, Mass., was elected president of the Metal Treating Institute at the annual meeting in the Graemere Hotel.

Other officers elected:

Vice president, Rowland H. Starr, Starr Heat Treating Co., Detroit; treasurer, R. W. Thorne, Bennet Steel Treating Co., Newark, N. J.; S. N. Clarkson, executive secretary; trustees, Fred Heinzelman Fred Heinzelman & Sons, New York; Charles H. Hewitt, Dayton Forging & Heat Treating Co., Dayton, Ohio; Paul J. Seitz, Commercial Steel Treating Co., Cleveland, for a term of two years.

Profit Sharing Council Formed; 55 Plants Join

CLEVELAND — Representatives from more than 100 industrial companies scattered throughout the United States, many of them engaged in metalworking, attended a constituent meeting of the Council of Profit Sharing Industries here recently and 55 of the companies contributed financially to the new organization.

James F. Lincoln, president Lincoln Electric Co., Cleveland, was named chairman; H. C. Nicholas, president Quality Casting Co., Orrville, Ohio, vice chairman; E. S. Patterson, president First National Bank, Akron, treasurer; and John D. Gordon, vice president Progressive Welder Co., Detroit, secretary.

Dr. R. S. Hartman, professor of philosophy, Wooster College, Wooster, Ohio, was named executive secretary and will carry the brunt of the Council's work as he has done in getting the organization underway.

The purpose of the council is:

1. Promote profit sharing as a means of preserving American system of free enterprise.
2. Promote good will and harmony among employers and employees.
3. Bring together those interested in promotion of profit sharing.
4. Assemble and disseminate information on profit sharing.
5. Encourage, organize and conduct research in the fields of employee-employer relations as they are affected by profit sharing.
6. Promote mutual interests of profit sharing industries.

Among prominent metalworking industries who became charter members were: American Cast Iron Pipe Co., Birmingham; Cleveland Twist Drill Co., Daisy Mfg. Co., Plymouth, Mich.; Lincoln Electric Co., Owen Bucket Co., Cleveland; Pacific Screw Products Corp., Southgate, Calif.; Pitney-Bowes, Inc., Stamford, Conn.; Signode Steel Strapping Co., Chicago; Swarthout Co., Cleveland, and Williamson Heater Co., Cincinnati.

William L. Dolle Elected President of AMTEA Corp.

CLEVELAND — William L. Dolle, president of Lodge & Shipley, Cincinnati, was elected president of AMTEA Corp., New York, at the quarterly meeting of the directors in Toledo. Mr. Dolle will fill out the unexpired term of the late Joseph Trecker.

Ralph W. Burke, vice president of Kearney & Trecker, was elected to fill the posts of secretary, treasurer.

Balanced Steel Supply Doubted Before Late 1948

PITTSBURGH — The undiminished interest in steel has led practically all analysts to the conclusion that a supply and demand balance in light flat-rolled steel products will not develop before the end of 1948, if then.

Continuation of such a tight situation until that time is now considered likely to have reprecussions in the form of some additional governmental pressure to increase capacity, notwithstanding that a report of Secy. of Labor Krug has tended to substantiate some of the expansion policies as pursued by members of the steel industry. Secy. Krug is less optimistic of the long-range raw material supplies of the steel industry than he is in respect to those of the near-term, but he hints that some government cooperation in respect to bolstering raw material procurement might be advisable.

This report mentions the St. Lawrence Seaway. None of the major steel companies has—and likely will not—take a position on the Seaway because of their sales to railroads, but it is believed that the corporations with plants in the Midwest—from Pittsburgh to Chicago area—are now definitely in favor of the Seaway.

The competitive position of these plants has been worsened by the constantly rising trend of freight rates and it now looms as advisable to bring iron ore to these territories —either from Labrador or from South American sources.

The tremendous cost of erecting a new steel plant on the Atlantic coast has tended to scare off some companies with ambitions of this sort.

E. T. Weir, chairman of National Steel Corporation, said the continued strong steel demand may be laid to a world which depends upon the U. S. for more than half of its steel, compared with 38% before the war, and a domestic "double need" which springs from inventory building and current consumption.

Steel ingot production was exceptionally heavy during October but this made little impression upon the huge backlog of demand which appears to hold on practically all sides.

Even slower-moving stainless and alloy grades have been in better demand recently.

Policies in respect to fourth-quarter deliveries are unchanged, with quotas to be cut 10 to 33 1/3% so that undelivered tonnages against previous quotas may be taken care of. This will give some consumers somewhat better tonnages than others depending upon how they fared previously. It is not considered likely that this system will wipe out all arrearages. This depends upon how good production is in the remainder of the quarter.

Recent developments have indicated that the mills' policy of holding the line against a higher scrap market may be doomed to failure. The approach of cold weather, plus reiterated statements of the scarcity of material, is having its effect on the market. Government-industry conferences are being held in connection with efforts to find some means of increasing supplies of scrap. If any government material is converted into scrap it will have to be mainly from supplies within this country, it is felt.

Steelmakers are still awaiting specific details of their obligations under the Marshall Plan. The British disclosure they will re-export some of the steel that country may receive was met with a shrug of the soulders in the steel industry.

Harold O. Hill, assistant chief engineer, Fabricated Steel Construction, Bethlehem Steel Co., took office as president of the American Welding Society at the conclusion of the 1947 annual meeting at the Hotel Sherman, Chicago, Oct. 24

Standardized Car Holds Attention of Railroad Men

CHICAGO—While the debate over lagging boxcar production continues, the standardized car, taking advantage of mass production methods to boost output, is attracting increasing attention from rail purchasing agents.

Introduced by Pullman-Standard early this year, standardized cars are now being produced by General American Transportation Co., American Car & Foundry and Pressed Steel Car. In addition the "packaged" cars are invading the hopper car field where some sizeable orders have been placed. At present one-fifth of all boxcar orders on the books of manufacturers are for these products.

Repercussions in metalworking fields are already being felt. Makers of railroad specialty items, such as doors and sides, admit that they are feeling competition. The result is that specialty makers are encouraging railroads to build more cars in their own shops. Railroads for years have made many of their own cars—of all the freight cars on the road some 15% were built by the roads.

Another development in the freight car field is a new type shock-absorber, a friction draft gear, which will be produced by A. O. Smith Corp., Milwaukee, for the Hulson Co., which will market it. The draft gear uses no cast steel—it is fabriated from rolled steel and is welded. A major advantage of the new device is a weight saving of more than six tons on a 50-car freight train.

Despite the ferment in freight-car building circles, and optimism over new technological developments, car builders are still not too optimistic about reaching the long-sought goal of 10,000 cars a month.

Price Question Grows in Steel

PITTSBURGH—Prices are becoming a more important question in the steel industry because of two factors —advancing cost of making steel, and a stronger "gray market." The latter is proving worrisome as Senate investigators are keeping a close watch on what happens to that market.

Long ago it was conceded that there would be a mill price increase in tin plate at the end of the year because this product was not advanced at mid-year. What is happening now is whether advancing costs might force some form of a general increase in steel prices at the mill level.

Some steel items, such as cold-finished bars and electric-weld mechanical tubing, which had been in slow demand during the summer, have been on the rise in respect to demand. This has also occurred at a time when products in which demand has been strong all along have been feeling a vastly increased amount of pressure. Even in structural shapes where a few soft spots appeared now and then, fabricators have been increasing their backlogs —in some cases rather sharply.

Names in the News

Lloyd J. Ely

John Elwood

Arthur W. Johnson

Lloyd J. Ely has been named factory manager of the Caterpillar Tractor Co.'s new diesel engine factory, scheduled to be in operation by the end of this year, while **John Elwood** will have charge of all diesel track-type tractor production, and **Arthur W. Johnson** becomes manager of the company's earthmoving equipment factory.

Byron C. Foy, chairman of the board of Jack & Heintz Precision Industries, Inc., Cleveland, has also been elected president, succeeding **William S. Jack. Albert A. Ricker,** vice president in charge of finance, has also been named to the newly-created post of assistant to the president.

Harry W. Holt has joined Hupp Corp., Detroit, as general sales manager. Since 1938 he has been vice president of Wilson Foundry & Machine Co., Pontiac, Mich., and prior to that was an executive of Bohn Aluminum & Brass Corp.

James C. Esterline has been named general manager of the L.G.S. Spring Clutch Corp., Indianapolis, Ind.

William Rodder, chief engineer of The Aetna-Standard Engineering Co. for the past nine years, has been elected vice president in charge of engineering.

James E. Mossell has been appointed sales manager of the Machine Tool Div. of the Buffalo Forge Co., Buffalo, N. Y. He succeeds the late **Earle G. Leonard.**

William J. Kaiser has been named general works manager for Commercial Controls, Rochester, N. Y., and its two subsidiaries, Electromode and Justowriter Corporations.

Robert P. Lewis, chief engineer of the axle division of Spicer Mfg. Div., Dana Corp., Toledo, Ohio, has been promoted to executive engineer.

Bennett Bronson has been appointed vice president in charge of administration of the Scovill Manufacturing Co., Waterbury, Conn. He has resigned as vice president and general manager of the Scovill Oakville Co. Div. to accept the newly created position. **H. Wesley Leavenworth** succeeds Mr. Bronson as general manager at Oakville.

E. R. Hinton, formerly vice president, has been elected president of the Olympic Steel Works, Seattle, Wash. He succeeds the late **C. W. Kucher,** who had headed the company since its organization in 1915.

E. W. Deck, formerly general manager of the Trent Tube Manufacturing Co., East Troy, Wis., will become manager of the Ithaca, N. Y., plant of the Morse Chain Co. Nov. 15. Mr. Deck was a war-time administrative official for the Manhattan Project and prior to that was associated with Linde Air Products Co. for 10 years.

Addison E. Wiles has been named manager of the Pittsfield Molded Products Works of General Electric Co., Pittsfield, Mass. He was formerly assistant manufacturing manager of the company's Plastics Div.

H. A. Grove has joined Atlantic Steel Co., Atlanta, Ga., as metallurgical engineer. He was formerly associated with Republic Steel Co., Aluminum Co. of America and the Batelle Memorial Institute.

Harry E. Sweet has been appointed factory manager of Aircraft Screw Products Co., Long Island City, N. Y., succeeding **Eugene Lang.**

Frank R. Kohnstamm, who was associated with Westinghouse Electric Corp. for 25 years, has joined Jack & Heintz Precision Industries, Inc., Cleveland, as general sales manager.

Robert L. Coe, vice president of Chase Brass & Copper Co., Waterbury, Conn., and vice president in charge of fabricated sales for Kennecott Copper Co., has been elected vice president in charge of all fabricating subsidiaries of Kennecott.

Patsy Qualtieri has been appointed district manager of the Los Angeles office of Micromatic Hone Corp., Detroit.

H. A. Gehres

H. A. Gehres, former vice president and director of engineering, has been appointed executive vice president of The Cooper Bessemer Corp., Mt. Vernon, Ohio, and **Ralph L. Boyer,** chief engineer, has also been named a vice president.

Ralph L. Boyer

J. P. Johnson

J. P. Johnson has assumed the presidency of the Romec Pump Co., Elyria, Ohio. He has served as vice president and director of the Aro Equipment Corp., since 1939.

Three new regional sales managers have been appointed by The Rapids-Standard Co., Inc., materials handling equipment manufacturers, Grand Rapids, Mich. **S. C. Tom Lloyd** is the new southwestern regional sales manager with offices in New Orleans; **John Kramer,** with offices in Kansas City, will serve as midwestern manager; while **Plin Mears** will be western manager. Mr. Mears has established a temporary office in Los Angeles, but will move to San Francisco early in 1948.

William H. Bolte, former production manager of the General Motors Linden, N. J., plant, has been appointed manager of the new GM assembly plant at Doraville, Ga.

BUSINESS ITEMS

Cincinnati Milling & Grinding Machines, Inc., has opened a new direct field engineering office in Room 218, Chamber of Commerce Bldg., 320 No. Meridan St., Indianapolis, Ind. The firm is a sales subsidiary of **The Cincinnati Milling Machine Co.** and **Cincinnati Grinders, Inc. Arthur Meals** and **Charles Williams** will work out of the new office which is under the supervision of **Howard L. Pope,** manager of the Cincinnati-Indiana territory.

The B. F. Goodrich Co. has formed a new division known as **The Plastic Materials Sales** division to handle sales of all the company's plastic materials. **L. H. Chenoweth** has been named general manager of the division.

Carboloy Co., Inc., has appointed the **Geo. W. Hubbard Hardware Co.,** 602 Mill St., Flint, Mich., as its authorized distributor in that area.

The Haydon Manufacturing Co., producer of timing motors and apparatus, has moved all its operations from Forestville, Conn., to Torrington, Conn., following the completion of a three-story addition to its former two-story quarters in Torrington.

The Keller Motors Corp. has been organized and will manufacture three types of automobiles in the former Huntsville Arsenal, Huntsville, Ala. Keller Motors has acquired the design, engineering, manufacturing and merchandising rights from the **Dixie Motor Car Corp.,** which purchased the assets of the **Bobbi Motor Car Corp.,** Birmingham. **George P. Keller,** former president of the Bobbi Car Corp., is president of the new firm and **Hubert R. Mitchell** is vice president and treasurer.

American Gage & Machine Co. has appointed **The Albert S. Roetheli Co.,** 24-16 Bridge Plaza So., Long Island City, N. Y., as New York City area representative for its several divisions, including the **Size Control Co.** and **Walsh Press & Die Co.**

The Hinderliter Tool Co., Div. of the **H. K. Porter Co., Inc.,** Tulsa, Okla., has acquired manufacturing rights for "Nail-It" pipe couplings, mud guns, swivel joints and pump section couplings. These will go into production immediately at the Tulsa works under the trade name of "Nail-It-Kwik."

Ampco Metal, Inc., Milwaukee, Wis., has appointed the **Welding & Cutting Supply Co.,** 2401 Carnegie Ave., Cleveland, as its distributor of Ampco-Weld resistance welding electrodes and alloys in that area.

Phoenix-Apollo Steel Co. has purchased the business of **The Phoenix Iron Co.,** Phoenixville, Pa., including its plant, machinery, equipment, inventory, supplies and contracts.

Dual Press Co., St. Louis, has appointed the **Machinery & Welder Corp.** of that city, as national wholesale distributor for sales and servicing of Dual brake presses. The new sales and service organization will be known as the **Dual Brake Press Div. of Machinery & Welder Corp.**

The International Nickel Co. has named the **Metal Goods Corp.,** 817 Seventeenth St., Denver, Colo., as distributor of primary nickel for alloying, and mill forms of Monel, nickel and Inconel in Colorado, Wyoming and New Mexico.

OBITUARIES

Cecil W. Machon, 68, general sales manager and assistant secretary of the Brown & Sharpe Manufacturing Co., Providence, R. I., died suddenly Oct. 11. Mr. Machon joined the company in 1898 and became sales manager of the Small Tools Dept. in 1917. He was also president of the Brown & Sharpe Co. and Brown & Sharpe of New York, Inc., sales subsidiaries with offices in the middle west and New York state.

Howard H. Barrows, 63, who has been associated with General Electric Co. since 1908, died Oct. 12. He served as manager of the Oakland Lamp Works, Oakland, Calif., from 1915 until his retirement early this year.

John H. Fellows, plant engineer of the Stanley Works, New Britain, Conn., and vice president of its subsidiary the Farmington River Power Co., died Oct. 7. He joined Stanley in 1906 and developed equipment for electric annealing and the processing of rolled steel.

A. Varner Hunnings, 69, retired engineer of tests for the American Locomotive Co. at its Schenectady and Pittsburgh plants, died Oct. 4.

Conrad Stellrecht, 78, president and treasurer of the Stellrecht Machine Corp. of Buffalo, and president of the National Grinding Wheel Co., North Tonawanda, N. Y., died Oct. 6 after a short illness.

John A. Johnson, 79, president and general manager of J. A. Johnson & Sons Sheet Metal Works Co., Salt Lake City, Utah, died Sept. 29.

MEETINGS

American Society of Mechanical Engineers. Annual meeting. Atlantic City, N. J. Dec. 1-5. Ernest Hartford. executive assistant secretary, 29 West 39 St., New York.

National Materials Handling Exposition. Public Auditorium, Cleveland. Jan. 12-16, 1948.

Society for Experimental Stress Analysis. Annual meeting. Hotel Pennsylvania, New York, Dec. 4-6. W. M. Murray, secretary-treasurer, Central Square Station, Cambridge 39, Mass.

Society of Automotive Engineers. Annual meeting. Book-Cadillac Hotel, Detroit. Jan. 12-16, 1948. John A. C. Warner, secretary and general manager, 29 West 39 St., New York.

The Backbone of Cost Saving Dimensional Control

If you are manufacturing mechanical elements, close dimensional control will save you assembly time because accurately sized parts fit together quickly. Applied directly at the machine, proper gages save you scrap losses and much machine time. When all the elements of a mechanical assembly are held accurately within tolerance, that assembly gives superior performance in service.

Around Sheffield instruments and gages have been developed some of the most effective dimensional quality control policies in the manufacturing field. Let us send you descriptive literature on cost saving equipment—it may lead to solving your inspection problems.

THE PRECISIONAIRE is a flow type air gage for measuring true and average diameter, bellmouth, out-of-round for through and blind holes—concentricity, squareness, straightness and parallelism —also many external dimensions. Write for catalog.

THE VISUAL GAGE is an indicating comparator set by means of precision gage blocks for checking external dimensions, the angularity of surfaces, the angularity between a bore and a surface, run-out, and the pitch diameter of screw threads. It is both a production and a tool room instrument. Write for catalog.

STANDARD GAGES

Sheffield can supply any type of standard or fixed size gage and a wide range of indicator gages for shop checking.

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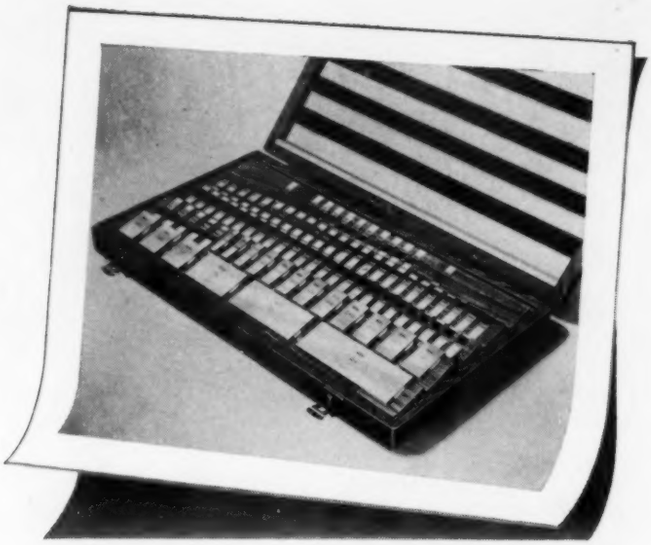
Dayton 1, Ohio ***U. S. A.***

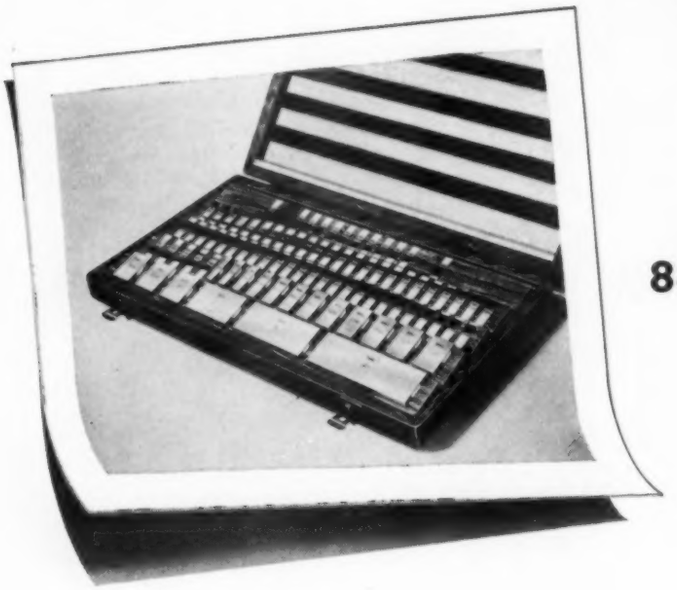
Sheffield MEASUREMENT CRAFTSMEN

Sheffield's principal products include Gages, Measuring Instruments, Machine Tools, Contract Services and Threading Tools. Standard Gages shipped within 24 hours.

WEBBER GAGE
84 BLOCK SET—84A
±.000004"

~~$350~~ $295





WEBBER GAGE
84 BLOCK SET—84B
±.000008"

~~$235~~ $195

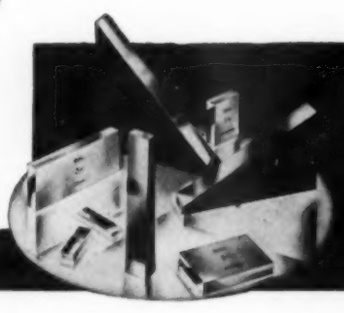
The refinement and dimensional controls introduced by Webber during the war are paying off in lower gage costs today.

There is no compromise with quality here. Accuracy, dimensional stability, surface finish and wear are the same as currently being employed by Webber users in thousands of shops from coast to coast. These new prices place precision within reach of many shops who have heretofore relied on less accurate means of measurement.

WEBBER GAGE CO.
12901 Triskett Rd. Cleveland J1, Ohio

WEBBER MAKES PRECISION GAGE BLOCKS EXCLUSIVELY

- ★ Gage Block Sets in Steps of .00005".
- ★ Individual Special Size Blocks.
- ★ Heavy Duty Gage Blocks.
- ★ Angle Gage Blocks in Steps of one second.
- ★ Carblox (Carbide) Wear Gages.



Webber
PRECISION
GAGE BLOCKS

American Machinist

REFERENCE BOOK SHEET

Hardenability Bands for H-Steels I

COURTESY AMERICAN IRON & STEEL INSTITUTE AND SOCIETY OF AUTOMOTIVE ENGINEERS

Steel purchased by the hardenability-band specification offers a method definitely obtaining two features necessary in the selection of an engineering material: (1) certainty of what the steel will do when heat-treated instead of mere description by composition limits, and (2) economy—the cheapest steel that will function properly.

More than 60 socalled H-steels have been evaluated by the hardenability band method. These bands, in chart form, offer an easy means of finding out whether a particular H-steel is suitable for the intended purpose under a given heat-treatment procedure. Some of the bands are reproduced on accompanying pages, others will be published in succeeding sheets.

Physical properties of different steels can be correlated closely with hardness in the fully heat-treated condition; chemical composition has little bearing on this correlation, except as it affects microstructure. Hardness is in fact an index of tensile strength between 200 to 400 Brinell.

Hardenability bands are based upon the Jominy and Boeghold end-quench test. This method (SAE Handbook) provided the means of predicting what hardness can be obtained at any point between the surface and center of any sized round, quenched in water or oil, if heated to the proper temperature. The hardenability bands (area between maximum and minimum hardness curves) reproduced indicate the spread in hardness that may be obtained at any depth in the corresponding H-steel.

H-steels are specifically of interest at this time and for the future because the postwar scrap situation makes it easier for the steel producer to supply material to hardenability-band specifications than to composition limits. Besides, steels made to composition limits do not offer the consumer as close a spread on hardenability as the H-steels. By standardizing on the latter, the user will have fewer rejects by failures of annealing, machining, or heat-treating, and actually can simplify his heat-treating control.

When making use of hardenability bands for specification purposes, specific points on the curves should be selected (see illustration) the full length of the curve should not be specified. It is recommended that for specification purposes, two points be used to designate the desired hardenability. Those two points may be designated in any one of the following ways:

1. *The minimum and maximum distances at which any desired hardness value occurs.* This method is illustrated as points *A-A*, and would be specified for the curves as J45 equals 4 to 11 sixteenths.

2. *The minimum and maximum hardness values at any desired distance.* This method is illustrated as points *B-B*, and would be specified for the curves as J36/50 equals 8 sixteenths. Obviously, the distance selected would be that distance on the end-quench test bar which corresponds to the section used, or of interest, to the consumer.

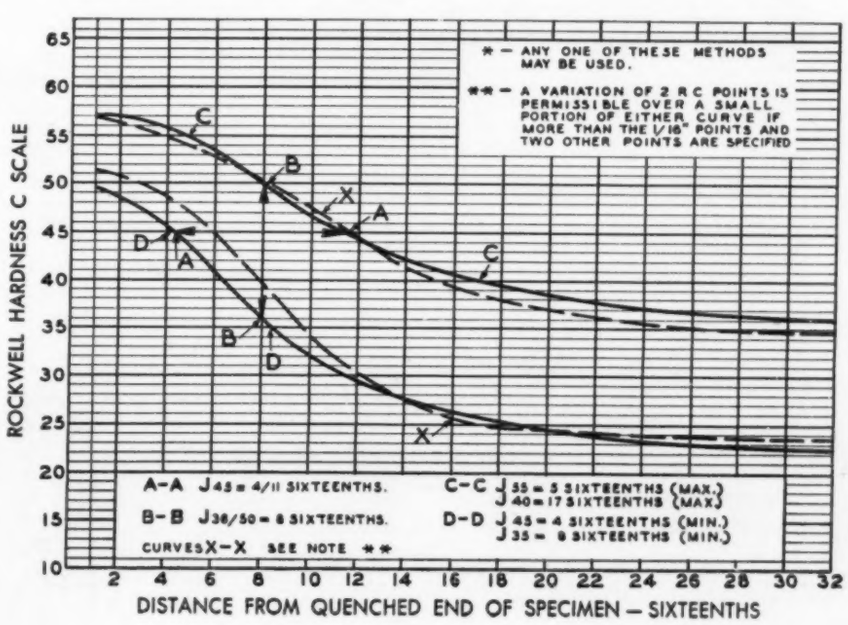
3. *Two maximum hardness values at two desired distances,* as illustrated at points *C-C*.

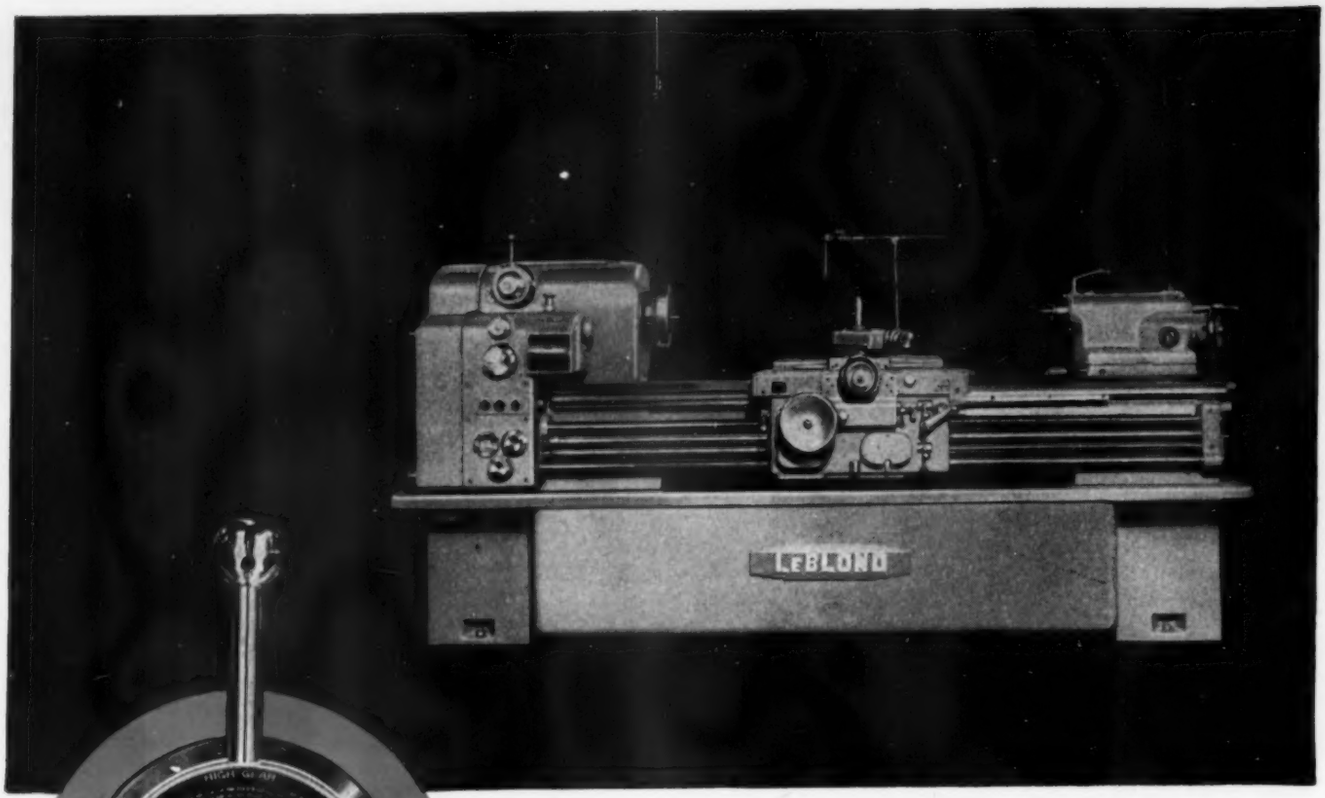
4. *Two minimum hardness values at two desired distances,* as illustrated by points *D-D*.

5. *Any point on the minimum hardenability curve plus any point on the maximum curve.*

In cases where it is considered desirable, the maximum and minimum limits at the 1/16-in. point may be specified in addition to the other two points.

Where it is necessary to specify more than two points on the hardenability band (exclusive of the maximum and minimum limits at 1/16 in.) a tolerance of two points Rockwell C over any small portion of either curve is to be permitted. This is necessary because it will be found that curves of individual heats may vary somewhat in shape from the standard band limits.


* — ANY ONE OF THESE METHODS MAY BE USED.
** — A VARIATION OF 2 R C POINTS IS PERMISSIBLE OVER A SMALL PORTION OF EITHER CURVE IF MORE THAN THE 1/16" POINTS AND TWO OTHER POINTS ARE SPECIFIED
A-A J45 = 4/11 SIXTEENTHS.
B-B J36/50 = 8 SIXTEENTHS.
CURVES X-X SEE NOTE **
C-C J 35 = 5 SIXTEENTHS (MAX.) J 40 = 17 SIXTEENTHS (MAX.)
D-D J 45 = 4 SIXTEENTHS (MIN.) J 35 = 8 SIXTEENTHS (MIN.)
ROCKWELL HARDNESS C SCALE
DISTANCE FROM QUENCHED END OF SPECIMEN — SIXTEENTHS



Select over 100 speeds
without stopping spindle

IN THE NEW LeBLOND 16" MODEL RT TOOL ROOM LATHE

MODEL RT TOOL ROOM LATHE FEATURES:

Speed adjuster unit shifts gears, controls speed, and jogs main drive motor. Combination gear-belt drive headstock provides over 300 spindle speeds 6 to 1500 rpm.

All main drive gears hardened and ground.

Universal quick change box totally enclosed, lubricated automatically.

Universal power rapid traverse moves carriage, cross slide, and tailstock.

Combined feed apron with positive jaw feed clutch and automatic lubrication.

Flame hardened and ground steel bed ways front and rear.

Thrust-lock tailstock with worm and rack construction; full length bearing for spindle; direct reading spindle travel dial.

Arranged for 7½ hp adjustable speed main drive motor.

You get a total of over 300 spindle speeds, 6 to 1500 rpm, in this newest LeBlond tool room lathe. Within any one of three ranges you can select over 100 speeds without stopping the spindle. This fast, easy method of obtaining speeds materially increases tool room production.

The universal power rapid traverse which moves carriage, cross slide, and tailstock electrically; the totally enclosed quick change box which offers five different types of 60 threads and leads each; the combined feed apron . . . are but a few of the many LeBlond engineering advances which make the Model RT a 'must' in the modern tool room. For complete information, send for Bulletin RT-30 today.

THE R. K. LeBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES
NEW YORK 6, Singer Bldg., 149 Broadway, COrtlandt 7-6621-2-3.
CHICAGO 6, 20 N. Wacker Drive, STA 5561.
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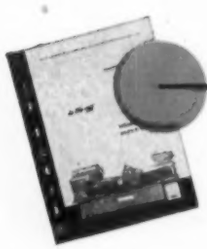

Get your free copy

of new illustrated bulletin RT-30 describing LeBlond's 16" Model RT Tool Room Lathe. Write Dept. 301.

LeBLOND

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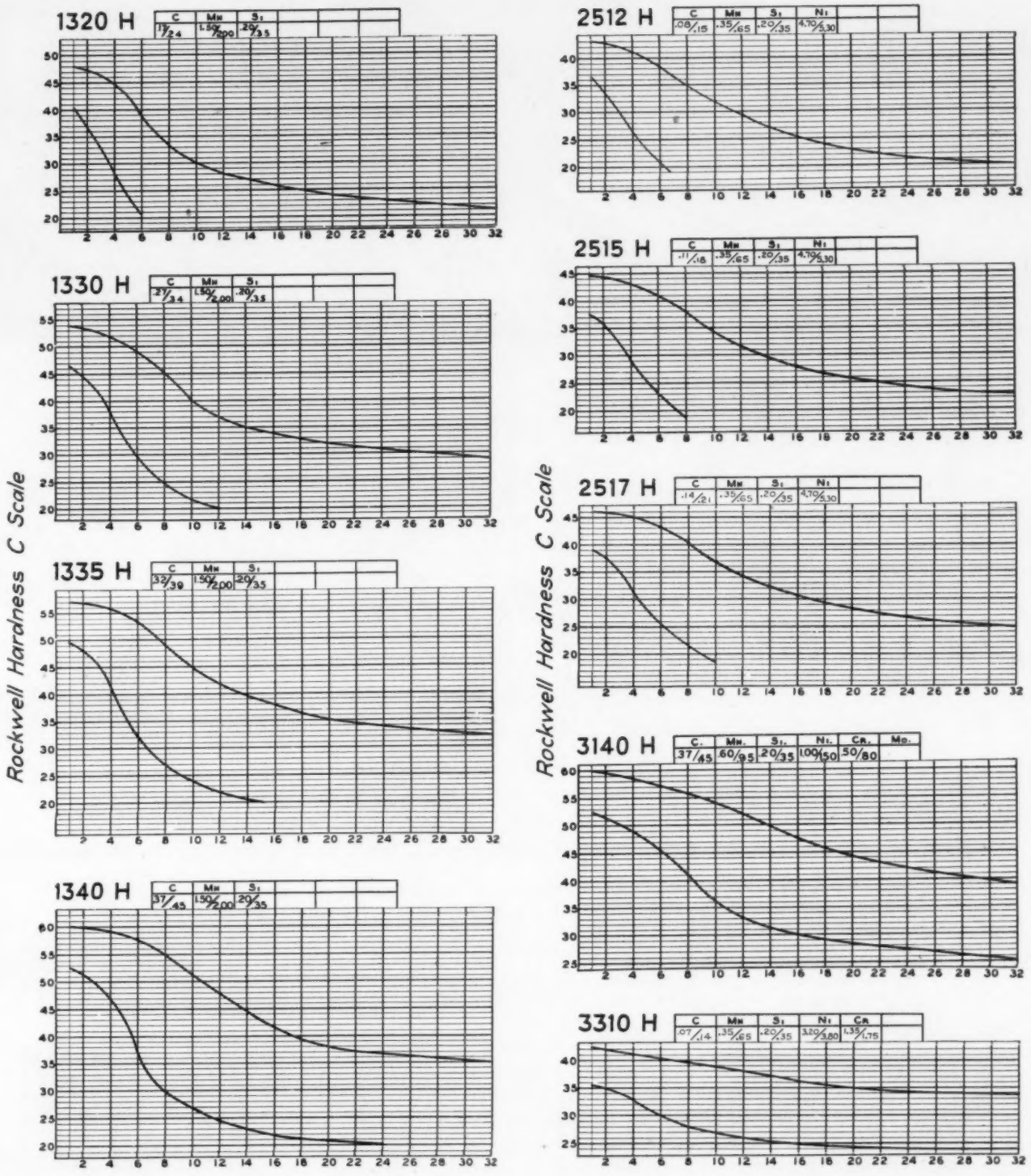
Hardenability Bands for H-Steels—II



Production Up 22% on 44-Inch Pinion Gears

SUNICUT . . .

Enables Gear Manufacturer to Increase Feed, Speed, and Tool Life; and to Improve Finish . . .

Since changing to Sunicut, a manufacturer of steel-mill gears has increased production by 22%, improved finish, and added greatly to the life of his gear cutters.

Operation: Cutting 44" herringbone gears.
Machine: Dominion herringbone gear generator.
Materials: Stainless steel, high carbon steel, bronze, other alloys.
Cutting Oil: Sunicut.

This case is just one of thousands in which experienced production men have found that Sun "Job Proved" cutting oils help to increase production and to improve quality as well.

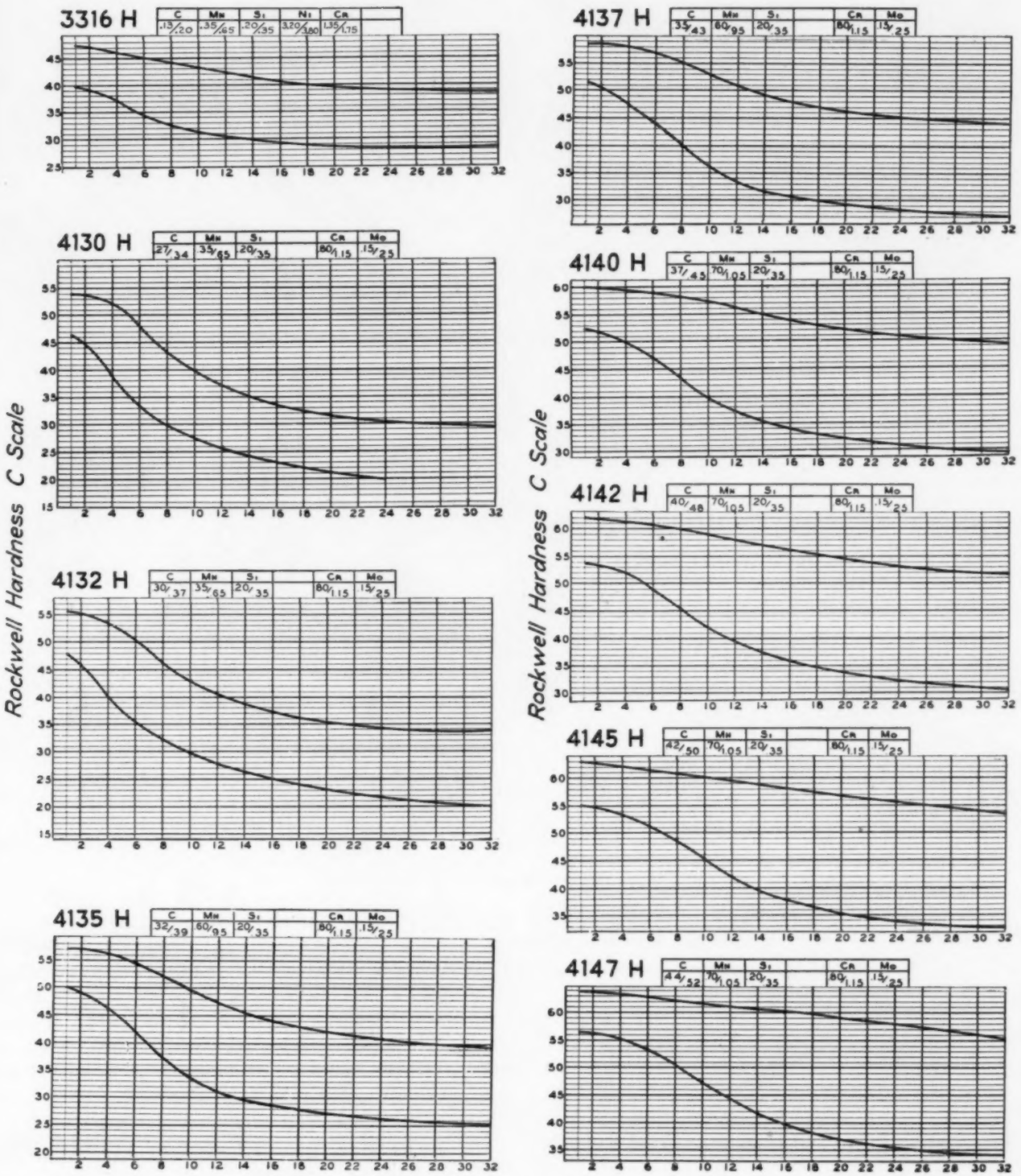
Sunicut is a clear, free-flowing cutting oil, produced by an exclusive Sun process. It has high lubricating value and has excellent heat-dissipating and anti-weld properties. It makes possible heavy cuts at high speed while accuracy and satin-smooth finish are maintained. For full information call your Sun Cutting Oil Engineer or write Dept. AM-11.

SUN OIL COMPANY • *Philadelphia 3, Pa.*
In Canada: Sun Oil Company, Ltd.—Toronto and Montreal

SUN
SUNOCO

INDUSTRIAL PRODUCTS

Hardenability Bands for H-Steels—III



EFFICIENCY...

right down the line

WITH SIMONDS ABRASIVE GRINDING WHEELS

SIMONDS ABRASIVE CO.

SIMONDS ABRASIVE COMPANY
is a division of
SIMONDS SAW AND STEEL CO.
Fitchburg, Mass.
Saws, Machine Knives, Files

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Lockport, N.Y.
Special Steels

SIMONDS CANADA SAW CO. LTD.
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Precision manufacture, proved performance, easy selection. These features of Simonds Abrasive's complete grinding wheel line mean fast action, lasting efficiency, fewer dressings all along your grinding production line. Learn how you can line up top results with Simonds Abrasive Grinding Wheels, Mounted Wheels and Points, Segments, Grains, Bricks and Sticks. Send now for free Data Book. Meanwhile, for your immediate wheel needs consult your nearest Simonds Abrasive Distributor who carries complete stocks.

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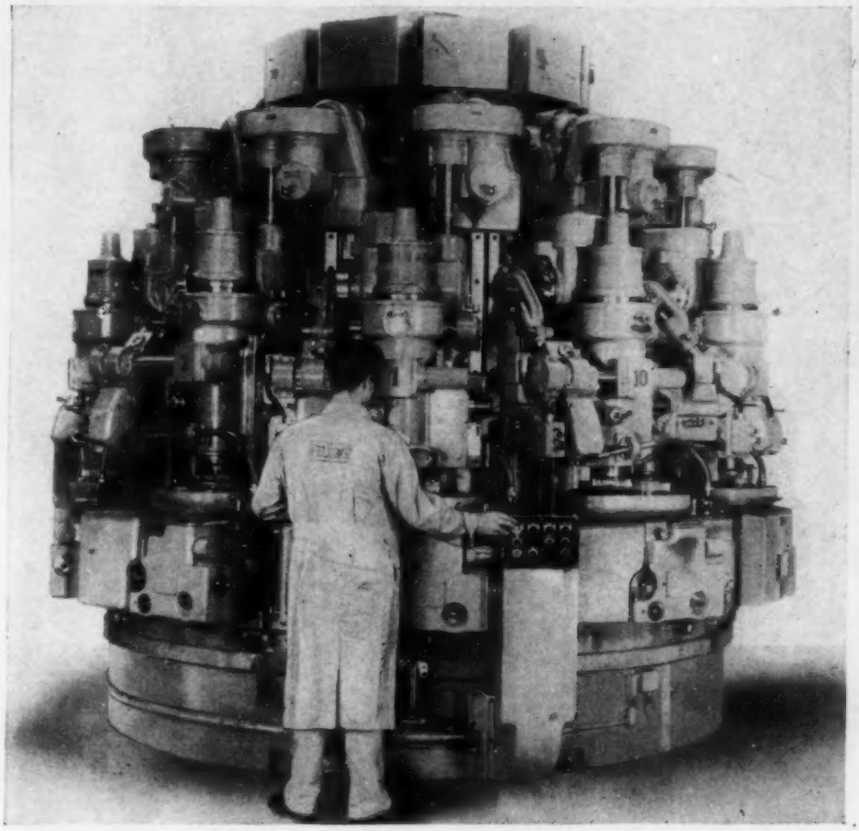
DISTRIBUTORS IN ALL PRINCIPAL CITIES

Shop Equipment News



Each station is a complete unit with individual motor drive and control

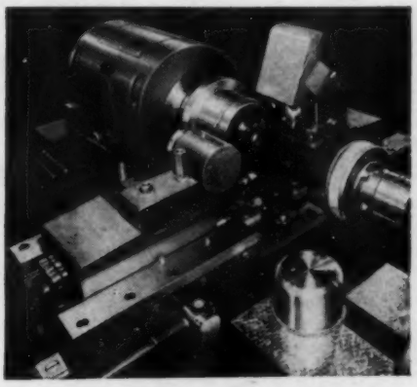
Fellows No. 10 Rotary Gear Shaper, Has Ten Individual Cutting Units

The No. 10 rotary gear shaper, which comprises ten individual and complete gear-cutting units, turret-mounted to rotate in either direction on a single base, has been developed by The Fellows Gear Shaper Co., Springfield, Vt. Each unit can be arranged for a different gear, or all units can be set up on the same gear.

Speed of rotation of the machine can be adjusted through change gears to suit any required cutting-time cycle. Each "station" is independently operated by a separate motor and timing control, and stops automatically when gear is completed. The machine itself is operated from a centralized pushbutton-control panel located at operator's position.

Vertically adjustable saddle beds have a maximum movement of 6 in. Rotary feed ranges from 0.007 to 0.028 in. per cutter stroke, and strokes range from 40 to 510 per min. through pick-off gears.

Capacities of the machine are: 12-in. pitch dia., 3-in. face width, and diametral pitch of spur ¾, helical 5/7. Designed for labor and space savings, the machine is 12 1/3 ft. wide, 13½ ft. deep (including chip conveyor), and 11½ ft. high. Total weight, including motors, control and conveyor, is about 85,000 lb.

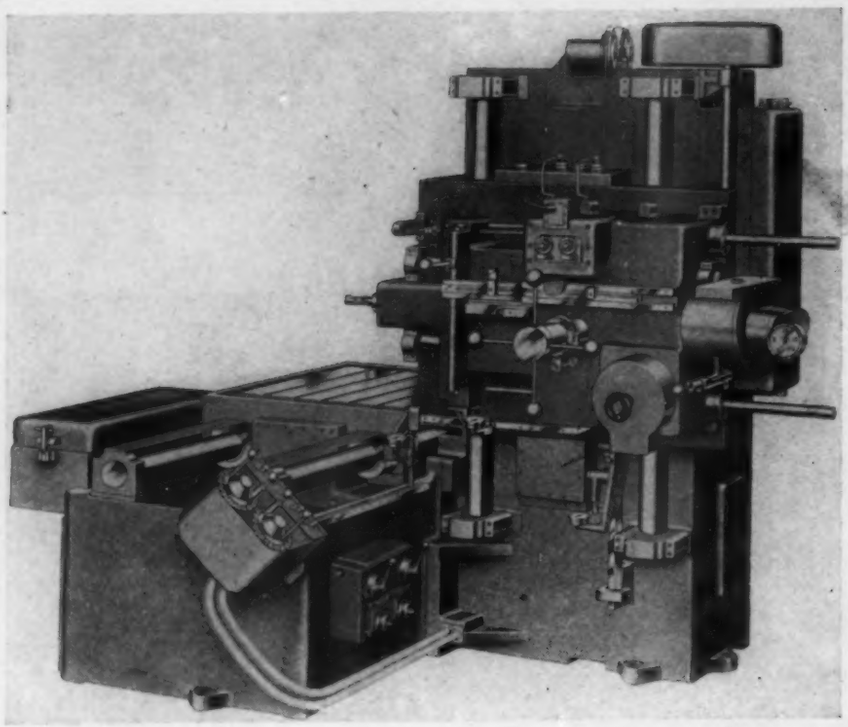


Bliss Spinning-Lathe Cross-Slide Attachment Works Independently

E. W. Bliss Co., 450 Amsterdam, Detroit 2, Mich., has announced an independently operated hydraulic cross-slide attachment for second-operation spinning lathes. The operation of the slide is arranged in an automatic cycle with pushbutton starter. Timing permits attachments to automatically move in on and retreat from the part for trimming, cutting, curling, and beading. All strokes and positions of the slide are controlled by adjustable dogs.

Aro Model 7022 High-Speed Drill Designed for Small Drilling Jobs

A high-speed air drill, Model 7022, designed for use on small drilling applications is available from Aro Equipment Corp., Bryan, Ohio. It is recommended for drilling wood and non-ferrous metals, and for cleaning stamping dies and molds. The tool has a speed of 26,000 rpm. and is equipped with chuck and lever throttle. It will accommodate twist drills from 0 to ¼-in. shank size.



Bullard Man-Au-Trol Locates Work In Relation to Horizontal Spindle

The No. 20 Man-Au-Trol Locator has been announced by Bullard Co., Bridgeport, Conn. It automatically locates work in relation to a rigid, horizontal spindle for drilling, boring, reaming, tapping and similar operations.

The 7-ton machine tool is composed of three basic elements: a table mounted on the bed and movable 20 in. longitudinally in either direction; a saddle mounted on a column and movable 20 in. vertically; and a spindle slide mounted on the saddle and movable 16 in. transversely. The table, saddle and slide each can be operated manually at any time.

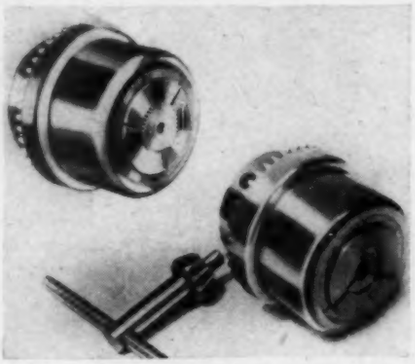
A dial sets the predetermined sequence of positions. There are 20 automatic stops for the table motion, and 20 stops for the saddle, giving a maximum potential of 400 positions where the center lines of each operation fall upon common ordinates.

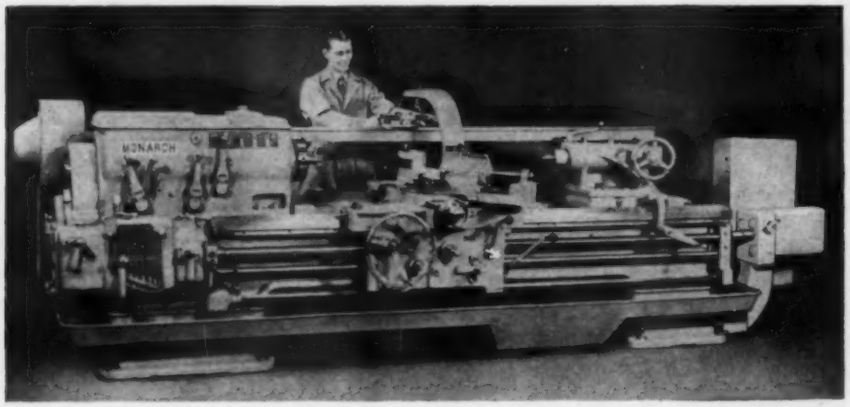
The range of the spindle is 4 to 24 in. above the work-carrying table. An adjustable drive incorporating a two-speed transmission provides spindle speeds from 84 to 2020 rpm. At constant torque, speeds are from 14 to 84 rpm.

Wheelco Capacilog Designed for Measurement Indication Control

Wheelco Instrument Co., 847 W. Harrison St., Chicago, Ill., announces a strip-chart recorder, the Capacilog. It is designed for the measurement indication control and permanent record of variables in the process industries.

In the Capacilog, Wheelco adds the recording function with a positive power-driven pen to the electronic link between measurement and control for deflection- and null-method types of measuring systems. It is operated on 115 or 230 v. and has a maximum power consumption of 60 w. The Capacilog is available as a deflection, potentiometer, or resistance thermometer type recorder, recording controller or indicating controller.





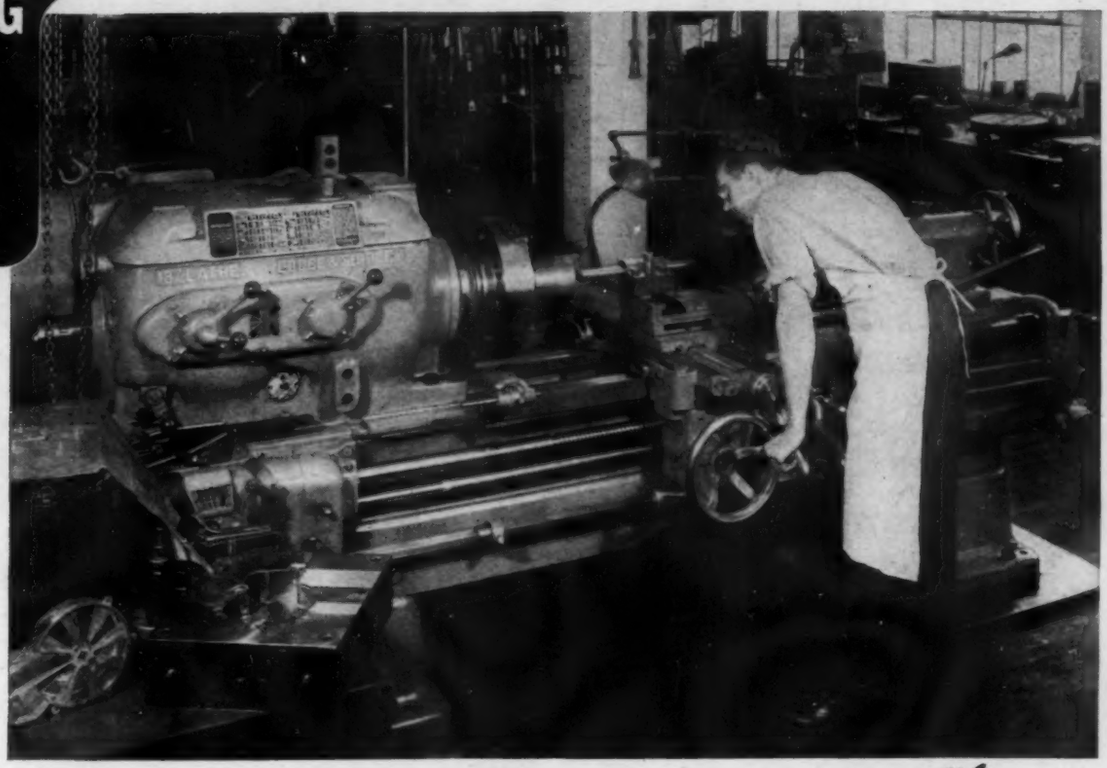
CLOSED CYCLE, RAPID-TRAVERSE return makes the machining cycle completely automatic on Monarch's 20-in. Model M engine lathe equipped with Type B Air-Tracer. Mounted at the right-hand end of bed, this return consists of a feed motor coupled to the end of the leadscrew and the necessary electronic control. Stepless feed range is ½ to 20 ipm. Made by Monarch Machine Tool Co., Sidney, Ohio

Bordjaw Small-Lathe Chuck Faced, Bored After Mounting

Edward Blake Co., 634 Commonwealth Ave., Newton Centre 59, Mass., announces a small-lathe precision chuck, similar in many ways to a collet chuck. This Bordjaw chuck, made by Universal Machine Div., Baird Associates, has lateral movement only and can be faced and bored after mounting on the lathe. The jaws can be bored on the lathe which is said to insure absolute concentricity. The body is marked so that numbered jaws can be removed from chuck and replaced. It is claimed that the chuck itself can be removed from the lathe and replaced without losing accuracy. It is made for lathes with spindle nose threaded ½-in. -8.

FEDERAL DIE CASTING CO.
Chicago

"Work turned within .0005" without difficulty ——output increased and working time saved"....

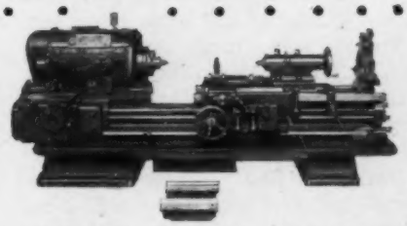


In the production of dies and parts for die casting machines, this manufacturer found Lodge & Shipley Lathes "an asset in our tool room." Highest requirements for accuracy were easily met . . . output increased and time was saved.

In the illustration above, a die casting piston is being machined on an 18" Lodge & Shipley Gap Lathe. Work up to 32" diameter, such as the die casting mold seen in left foreground, is also turned on this lathe. The removable Gap Block, in the words of this owner, "eliminated the necessity of a larger lathe."

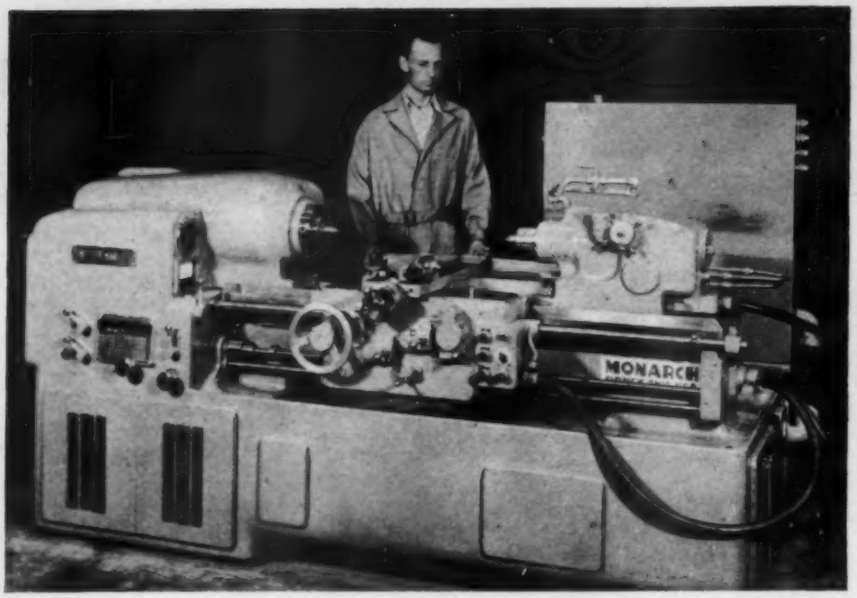
Whatever your needs, there is a Lodge & Shipley Lathe: Engine, Tool Room, Manufacturing, Oil Country, Duomatic (automatic), Gap and Turret Lathes in a variety of types and sizes. Write for Condensed Catalog.

LODGE & SHIPLEY LATHES at work



Adaptable to a wide variety of work particularly in maintenance shops. On jobs with unusually large diameter you don't need another lathe—just remove the gap block to handle it. In sizes 12" to 25"

THE **Lodge & Shipley** COMPANY
CINCINNATI 25, OHIO
MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.



Longitudinal movement of spindle is hydraulically controlled on this unit, with slow speed for drilling and fast traverse for advancing and retracting

Monarch 13-in. Toolmaker's Lathe Controls Tailstock Hydraulically

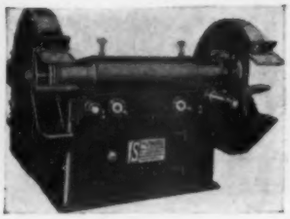
The 13-in. Toolmaker's lathe made by Monarch Machine Tool Co., Sidney, Ohio, features rapid longitudinal and cross traverse controlled from the apron, hydraulic control of tailstock and spindle clamping, and provision for constant surface cutting speed.

An electronically excited motor-generator in the base of the unit supplies the dc. for the 7½-hp. variable-speed drive motor. Swing over bed is 15½ in., over compound rest is 8¾ in. Distance between centers is 30 in. Weight of the lathe is 6000 lb.

The top speed range of 250 to 2000 rpm. is supplied by direct belt drive. With back gearing, three lower ranges cover a total range from 12.5 to 945 rpm.

Both constant surface cutting speed and shifting to desired speed range are electrically controlled from the right-hand end of the apron. Other switches at the same position are for manual spindle speed, and starting, stopping and reversing the main drive motor. A leadscrew-reverse mechanism is also controlled from the apron.

An individually motor-driven rapid-traverse unit is located at the left-hand end of the machine, providing rapid longitudinal traverse of 100 ipm., right or left, through the longitudinal feed control. The cross-feed control provides rapid cross-traverse of 50 ipm., in or out.

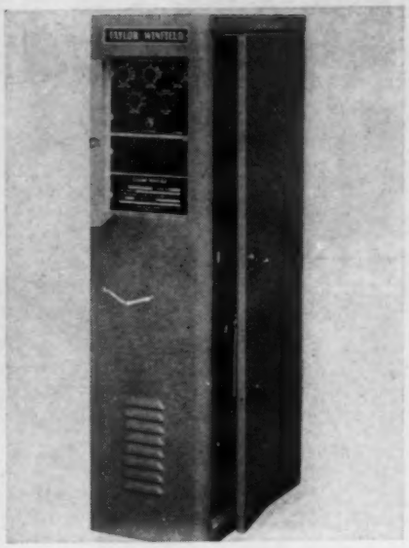


Variable-Speed Snagging Grinder Has Independent Grinding Wheels

No. 35 Twin-Motor variable-speed snagging grinder which carries two 24x3x12-in. grinding wheels is announced by Standard Electrical Tool Co., 2480 W. 6th St., Cincinnati 4, Ohio. Each operator is entirely independent of the other. This machine is designed for high speed resinoid-bond wheels and has an infinite speed range from 1480 to 2200 rpm. A Limit-Stop reflects correct spindle speed in relation to wheel dia.

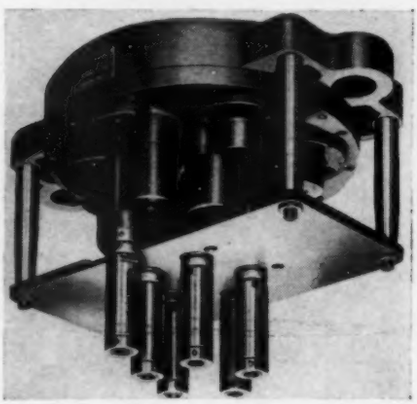
Market Forge's Load-Veyor Made Entirely of Aluminum

Market Forge Co., Everett 49, Mass., announces a standardized Load-Veyor made entirely of aluminum. Grid-like structure provides greater strength in all directions. Both sides of the wheel conveyor can be used. A 10 ft. unit weighs 30 lb.



Taylor-Winfield Non-Synchronous Controls for Resistance Welding

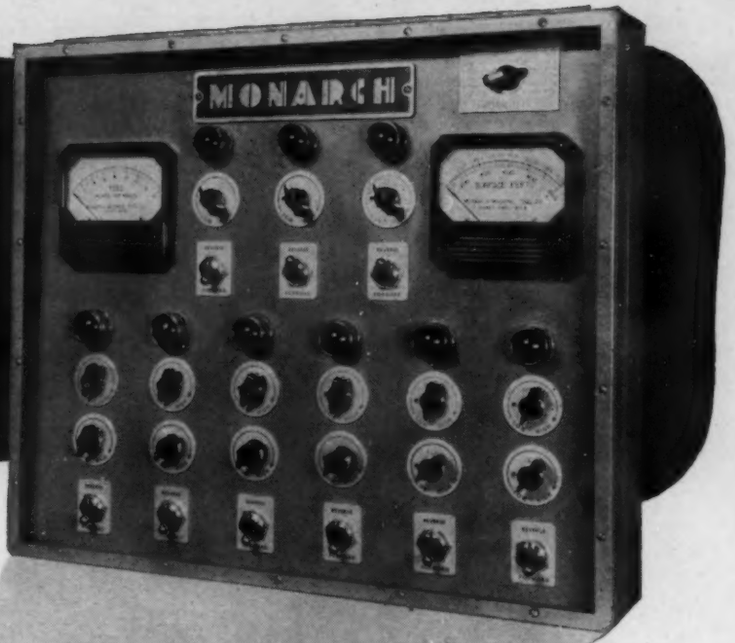
Non-synchronous welder controls, exhibited at the Metal Show by The Taylor-Winfield Corp., Warren, Ohio, are designed for foot-, air-, motor- and hydraulically-operated spot, projection, butt and seam resistance welders. The unit illustrated, NEMA Type N2 Combination non-synchronous control, is suitable for mounting on the side of resistance welders. This control consists of NEMA 3B Sequence Weld Timer and Ignitron Contactor for Size A, B and C power tubes.



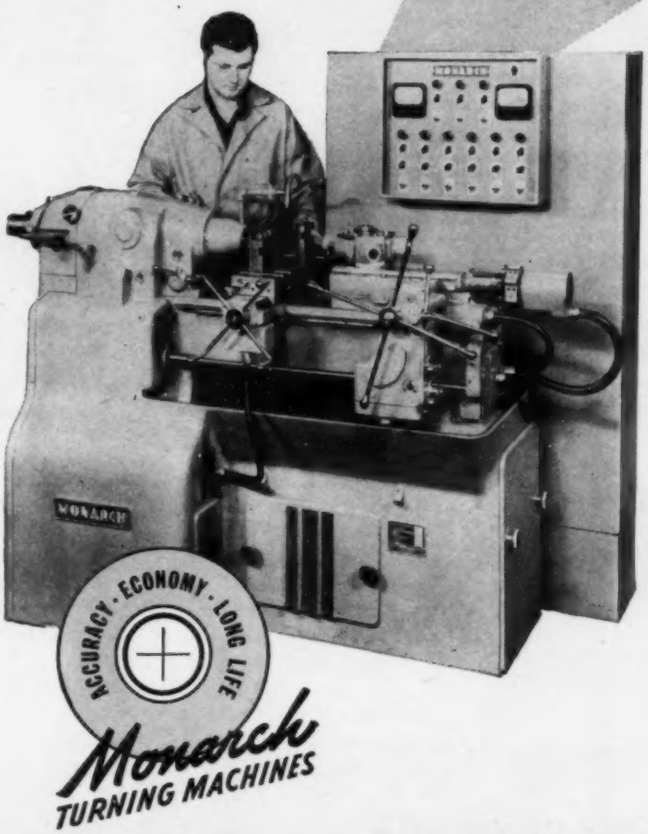
2 to 6 Spindles on Medium-Duty Line of Kwick-Change Drillheads

Strutz & Mead, Inc., Milwaukee 2, Wis., announces a line of medium-heavy-duty multiple drillheads. They are available in standard models having from 2 to 6 spindles. These Kwick-Change drillheads will drill holes up to 23/32 in. in cast iron. They have a gear ratio of 1:1 so that a leadscrew can be used in tapping operations. Minimum center-to-center location is 1⅝ in.

Set it... Forget it



You can pre-select any 9 spindle speeds—up to 5000 RPM any 6 feeds—from 1/8" to 16" per min. on the MONARCH SPEEDI-MATIC "World's fastest hand screw machine"

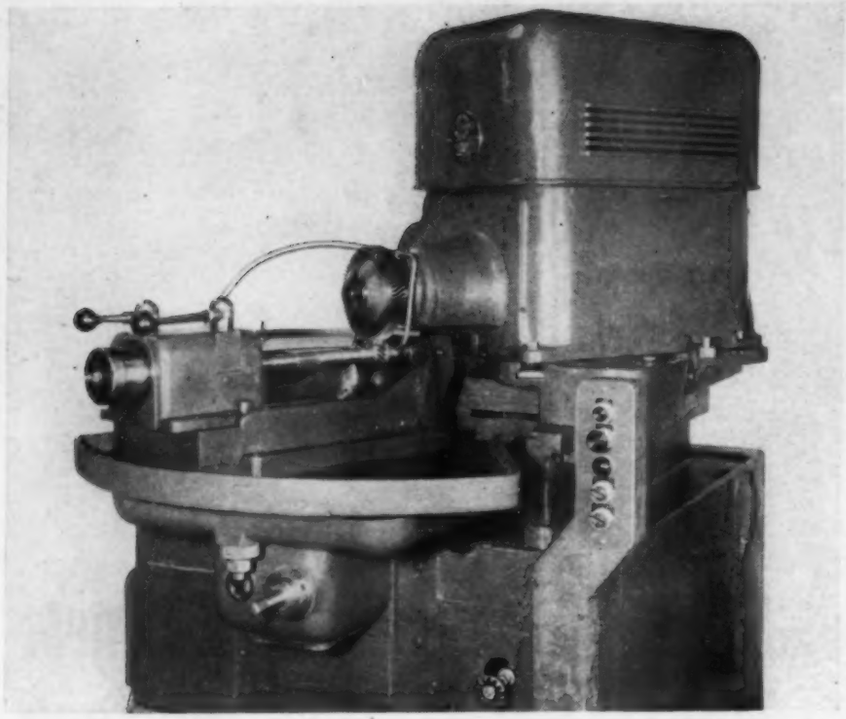


Automatic electronic speed and feed change —in a wide, stepless range—saves as much as fifty per cent on production times, and results in better finishes, closer tolerances, too.

But gearless, stepless all-electric drives are only part of the reason why you'll get *precision peak production at a profit* with the new Monarch Speedi-Matic. Dollar for dollar and second for second, we'll match its performance against any other machine of the same capacity (up to 7/8" bar stock) on lots of 25 to 500 or more. Like additional facts? Ask for bulletin 1902.

THE MONARCH MACHINE TOOL CO.
Sidney, Ohio

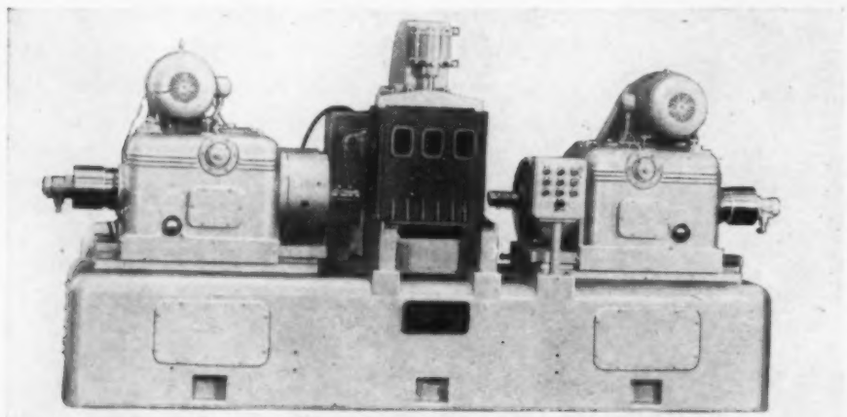
FOR A GOOD TURN *FASTER*——TURN TO MONARCH



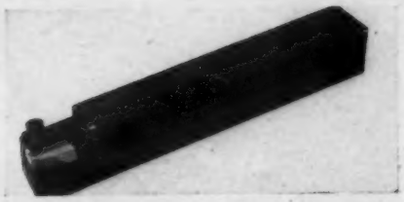
Tool Reciprocates at Angle to Work On Fellows Gear-Shaving Machine

The No. 8 "Full-Tool" gear-shaving machine, made by The Fellows Gear Shaper Co., Springfield, Vt., incorporates a method of cross-axes shaving in which the axis of the work is set up at an angle relative to tool reciprocation, instead of parallel with shaving-tool travel. This feature is said to distribute cutting action over a greater area of the face width of the shaving tool; to increase skidding action of the tool; to reduce stroke length, thus increasing reciproacting speeds; and to increase surface speed of the tool 25 to 50%.

The machine incorporates two motors; one, a 1-hp. main motor, drives the slide-reciprocating mechanism, depth-feed cam and other mechanisms, while the second motor, a 5-hp. unit, drives the tool spindle through a V-belt and change gears. Maximum pitch diameter of work is 8 in., maximum face width is 2½ in., and maximum stroke is 4 in. Electrical controls include start, stop, jog, and run pushbuttons. It is said that one cycle is sufficient to finish the average run of work by "Full-Tool" shaving.



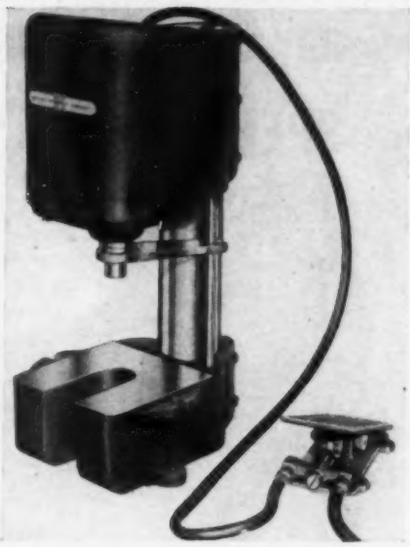
SPECIAL MACHINE utilizes carbide-tipped toolbits for facing main bearings on diesel-engine cylinder blocks. Parts are located and clamped by power, then machined automatically. Production is said to be 41 cylinder blocks net hourly. Made by Cross Co., Detroit 7, Mich.



Toolholders Made by Econotool Have Two Clamping Positions

"2-in-1" Econotools for turret lathes, engine lathes and small boring mills are made by Econotool Co., Jenkintown, Pa. They are toolholders made of alloy steel and have two clamp positions. Thus if a cutting tip is ground after use and becomes too short for first clamping position, it can be held in the next one.

A flexible spring-steel clamp arrangement is said to permit stalling in the cut with feed engaged without shattering tip. Any grade of cutting tip can be held in any one of the four styles of holders.



Bryant's Air-Hydraulic Press Features Controlled Ram Speed

An air-hydraulic press for light forming, riveting and assembling has been announced by Bryant Products Co., Dept. AM, Jackson, Mich. It features controlled ram speed and pressure. Ram speed can be varied from 1 to 40 strokes per min., and is said to have fast return regardless of cycle speed.

The distance between the ram face and table of the unit is adjustable by means of screws at the back of the head. A solenoid valve provides for automatic operation and also for control of length of stroke. The press is built in three sizes exerting 900, 2500, and 5000 lb. on the downstroke.

The "Show" PROVED it! SURVEYS Confirm it!

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Turn to Carbides!

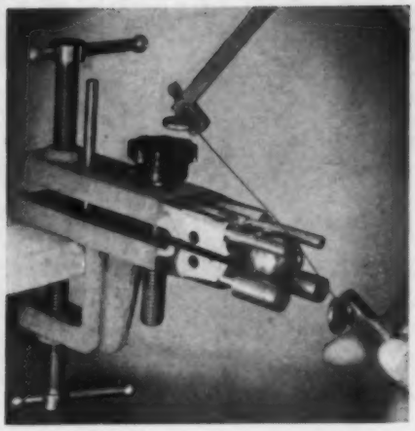
Practically universal acceptance of carbide tooling marked the 1947 Machine Tool Show.

The machines are ready! The tools are available! The know-how is yours for the asking! NOW is the time to put carbides to work throughout your plant—to help you keep pace with other leading plants* of the nation in the battle for competitive markets.

—and in applying carbides, our entire organization is at your service to help you obtain maximum effectiveness at minimum cost. Let our engineers show you how over 600 low-cost standard Carboloy tools and blanks can be applied to 60%-80% of your machining applications. Write for Catalog GT 711 just off the press. CARBOLOY COMPANY, INC., 11149 E. Eight Mile Road, Detroit 32, Michigan.

*In a recent survey by a leading metal working magazine, one out of every five plants stated carbides would be used for 70% or more of their new machine tooling. One out of every two indicated 50% or greater carbide usage.

and Turn to **CARBOLOY** CEMENTED ® CARBIDES *for Lowest-cost Carbide Tooling*

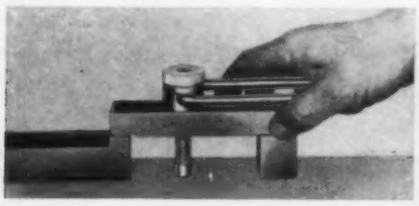


Uydess Bench-King Vise Holds Odd Shapes by Use of Steel Fingers

Benj. Uydess & Sons, Inc., 962 East 167th St., Bronx 59, N. Y., announces the Bench-King vise in solid bronze with tool-steel fingers. It is said to eliminate the danger of a jewelers' saw blade breaking while cutting out intricate templates, cutterplates, and die sections.

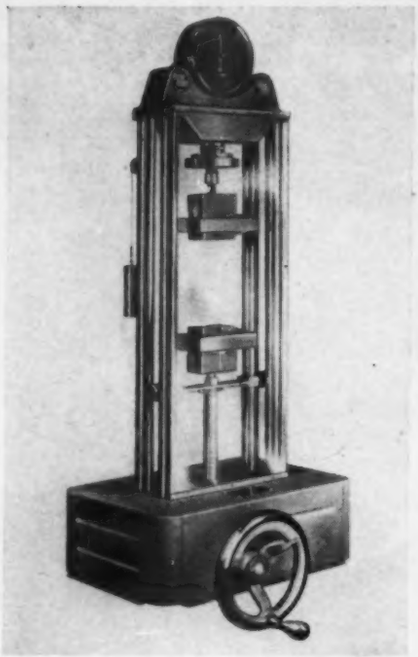
The work is said to be held without being marred because of the ground surface on the inside of the jaws. The work position permits layout or guide lines to be visible at all times. Thicknesses from 0.001 in. to 2½ in. can be held at any point within the jaws.

Shiftable fingers held in six receptacles within the upper and lower jaws allow work of odd shapes to be handled without use of special setups. Two additional receptacles on each side of the vise are included for accomplishing various combinations of fingers. The vise weighs 4½ lb. complete with accessories.

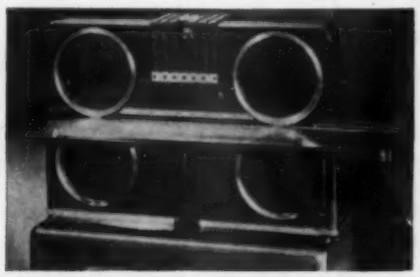


Work Clamped by Jig-Nut Device Without Use of Wrenches, Tools

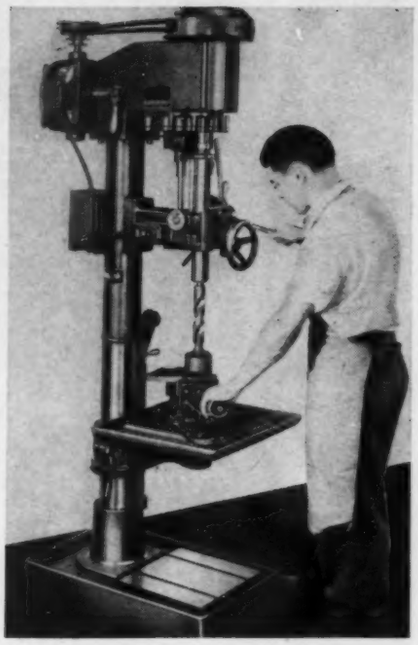
The Jig-Nut, made by The Jig-Nut Corp., 744 Broad St., Newark 2, N. J., has been developed for use with work-holding fixtures or as part of conventional machine setups. It is said to eliminate the need for wrenches or tools in clamping work under strap clamps. Made to fit standard stud threads, this quick-acting nut needs only to be screwed down finger tight and more than ample pressure is exerted by cam action obtained by depressing the handle from vertical to horizontal. Among advantages claimed are the ability to turn the handle to any position radially before depressing it and self-locking qualities which make the clamping action shake-proof.



PHYSICAL TESTER, Model L, made by W. C. Dillon & Co., Inc., 5410 W. Harrison St., Chicago, Ill., tests long specimens as well as those with considerable stretch. Uprights give 13-in. spread between grips. Grips are interchangeable to handle tensile, transverse, compression, or shear tests. Model available in 7 ranges: 0 to 25 lb., to 0 to 10,000 lb.



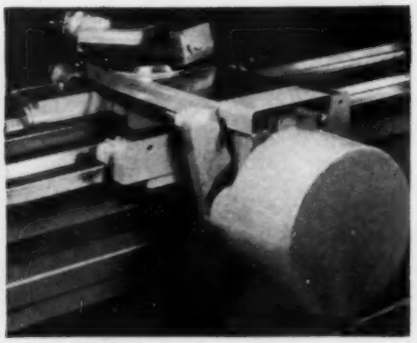
THERMOBEADER is for straight-edge beading of thermoplastic-type sheet stock, die-cut blanks and strips from 0.005 to 0.020 in. thick. Interchangeable dies provide nine different standard-size beads and shapes. Automatic die-temperature control provided. Sheet can be beaded at rate from 500 to 1000 ipm., depending on material. Made by Taber Instrument Corp., North Tonawanda, N. Y.



High-Speed Drilling and Tapping Performed by Sibley Model C-20

Model C-20 high-speed drilling and tapping machine is introduced by Sibley Machine & Foundry Corp., Dept. AM, South Bend, Ind. The unit has 20-in. swing, 2-hp. motor and can drill 1½ in. in mild steel.

Selection of geared power feeds is made by turning a knob. Speeds are changed by a positive release lever. There are four speeds from 65 to 225 rpm. in back gear, and four speeds from 400 to 1360 rpm. in direct drive. Feeds are 0.003, 0.006 and 0.010 in. Table arm and spindle are said to be exactly aligned because arm is bored after assembly with spindle.



ATTACHMENT provides constant surface cutting speed over a range of diameters from 2½ to 10 in. for the 18-in. Model 60 Toolmaker's lathe made by Monarch Machine Tool Co., Sidney, Ohio. A 5-hp. dc. motor is incorporated. Operator selects one of 16 speeds for diameter at start of cut, turns dial to same diameter, and then engages rheostat (that controls motor speed) with the screw feed

"It Isn't Santa Claus, Kiddies"— but Brand and Baby both Benefit

. . . when AMERICAN PHILLIPS SCREWS Speed Assembly— Make Sturdier, Smarter TOYS

IN THE PLANT — It's a Xmas Bonus in time-savings (up to 50%) for toy manufacturers who cash in on the super fastening speed of American Phillips Screws. *Automatically* straight to drive, non-slipping, they can't harm product or personnel. Screws can't be fumbled, time can't be lost, heads can't be burred. Whether you make miniature trains or real ones, sofas or stoves, radios or refrigerators—output and savings go *up* when American Phillips Screws go *in!*

IN THE SHOWROOM — Toys (or whatever you make) have both a "can take it" and "take me with you" look! For children and grown-ups, there's the safety, non-snagging feature. American Phillips Screws join your sales promotion staff, make your product sturdy, eye and buy-appealing. And more and more buyers know it!

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

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4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

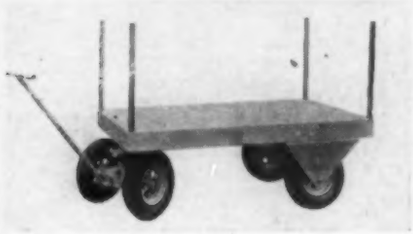
AMERICAN PHILLIPS *Screws*

ALL TYPES

ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

Macdonald Temperature Controller Employs Continuous Flow of Power

A proportioning electronic temperature controller has been developed by The W. S. Macdonald Company, 33 University Rd., Cambridge, Mass., which is said to maintain the temperature of electrically heated ovens within 0.1 F. at temperatures to 1200 F. This is accomplished by electronic adjustment of the input power to the oven. There is a continuous flow of power rather than "on-off" cycles. Selection of temperature is made by means of a large venier-type dial. Operated on 110 v. ac., it is adaptable to furnaces requiring 110 or 220 v. ac.

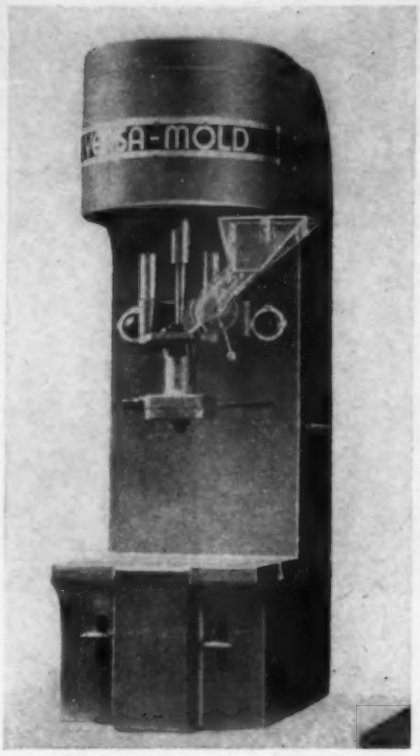


Market Forge Indoor-Outdoor Truck Has 2500-lb. Capacity

Market Forge Co., 25 Garvey St., Everett, Mass., announces an indoor-outdoor pneumatic-wheeled truck for use where quietness of operation, cushioning of load or unsatisfactory floors make this type unit essential. Rounded corners are provided as well as rounded edges for a safety factor. The truck has a rated capacity of 2500 lb. and a height above the floor of 22 in. It is 30 in. wide and has 60-in. long loading space.

High Tensile Strength Welds With Series 67 EutecTrodes

EutecTrodes 67 AC and 670 DC for arc-welding at low base metal heat have been added to the "Low Temperature" series of Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y. They have a high alloy content and were developed for joining, filling, filleting and overlaying all types of steel where high tensile and impact strength; good heat, corrosion and wear resistance; and high hardness values are required. Diameters available are 3/16, 5/32, ⅛ and 3/32 in.



Ferracute's Injection Press Molds Nylon, Thermoplastics

Ferracute Machine Co., Bridgeton, N. J., has introduced a 1-oz. injection press, the Versa Mold Press, used in molding nylon, Lucite, Plexiglas, polystyrene and other thermoplastics. It is an air-actuated ram press capable of exerting a ram pressure of 8,000 lb. at 80-lb. line pressure. The mechanism is comprised of a double-acting air cylinder and press. Attached to the frame is a material hopper of Lucite with a capacity sufficient for several operations.

An electric heater brings material at and near the bottom of the cylinder to proper molding temperature. An adjustable thermostat and thermocouple, having a range to 600 F., maintains temperature.

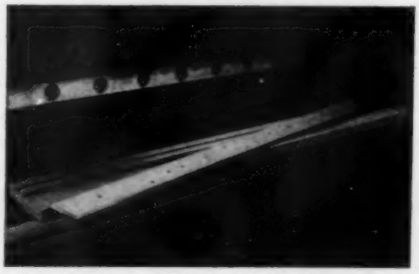
Operation of the cylinder is controlled by an air safety device. To start the ram downward, pressure is exerted downward on two handles by the operator. Molding cycles continue until completed. Speed of stroke and duration of dwell at bottom of stroke is controlled by adjustable air valves. A special holder keeps mold closed during injection, utilizing press pressure.

Regulating Trigger Controls Air Flow in Superior Bully Blow Gun

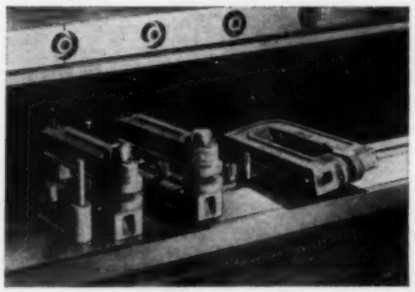
Superior Mfg. Co., Cleveland, Ohio, announces the Bully Blow Gun which has a regulating trigger giving controllable air flow from a gentle to a powerful blast. This gun is said to eliminate the use of bellows or brush for delicate cleaning jobs. It has no stuffing box, disks, or springs and is said to be leakproof. A hanger bar at the top of the gun allows it to be hung out of the way when not in use. Weight is 10 oz.

Wales Hole-Punching Units Mounted by "Strip" Templets

Wales hole-punching and notching units are now mounted in press brakes by "Strip" templets. Made by Wales-Strippit Corp., North Tonawanda, N. Y., the templet fits into a Wales press-brake rail equipped with T-slot. The rail remains in the press brake when setups are changed, and templets are. . . . . .



simply lifted out of the rail. Dowel or pilot holes are drilled and reamed in the "Strip" templets. . . . . .



at the center of the locations of the holes to be punched. The holes in the templet are for the pilot pins in the self-contained Wales units.

Avey Automatic METHOD No. 9

THE Avey CAM FEED UNIT

No. 1 Size—1/2" capacity in cast iron.

No. 2 Size—7/8" capacity in cast iron.

CENTER COLUMN TYPE MACHINE

designed for multiple operation on two faces of work, where work includes too many holes or operations to be performed by center rotating table methods: (drilling—reaming—tapping).

METHOD No. 9 — Multiple tooling with tools accessible. Machines usually furnished in pairs, or with double fixtures at each indexing position, so that top and one side of work can be presented at one time, while bottom and opposite side can be presented in second position or on second machine.

THE AVEY DRILLING MACHINE CO.
CINCINNATI • OHIO • U. S. A.

Send for Engineering Bulletin 645

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Avey DRILLING MACHINES
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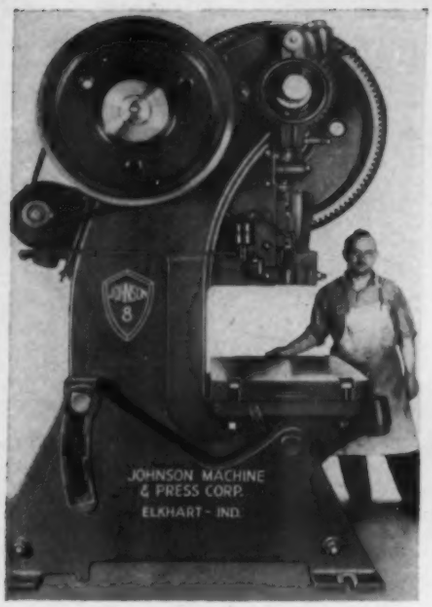
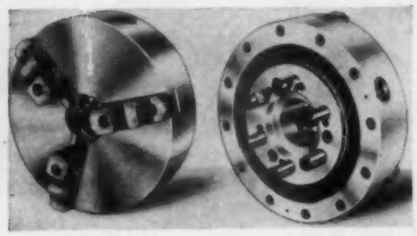
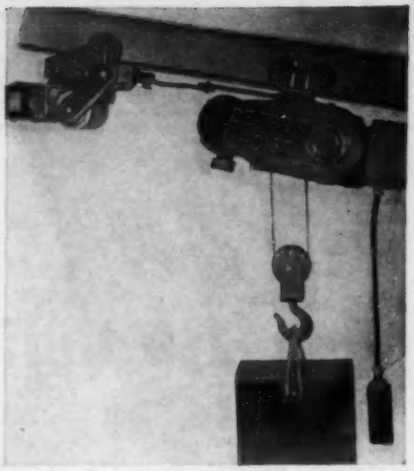


90-Ton Capacity Inclinable Press Made by Johnson Machine & Press

The Johnson Machine and Press Corp., Elkhart, Ind., has introduced an inclinable power press of 90-ton capacity. It can be used in the horizontal position or can be tilted back at a 25° angle so that work will drop away from the press without the use of an ejector. This press is able to handle work up to 15-in. depth and produces 44 pieces per min. It has an extra-thick bolster plate which provides strength for heavy operations without reducing die space. A patented tripping device is designed to protect the operator in case of spring breakage. An adjustable friction-type brake is located within reach of the operator. A 7½-hp., 1800-rpm. motor is the power source.

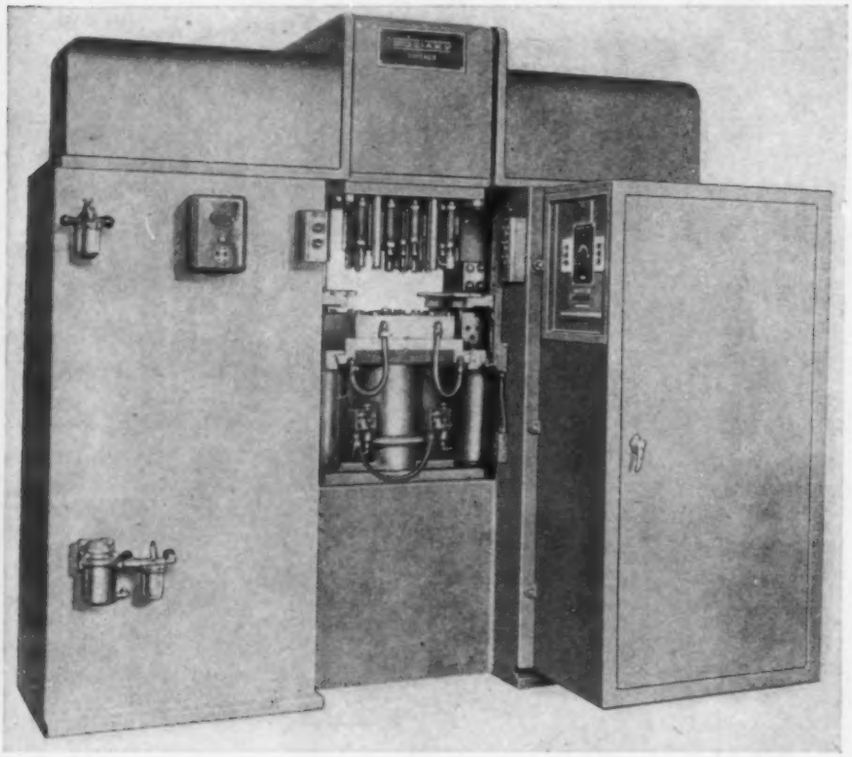


BODY CHUCK announced by The Whiton Machine Co., 509 Howard St., New London, Conn., is made of Whit-Aloy, a special-analysis aluminum claimed to have the strength of steel and wearing qualities of cast iron with the lightness of aluminum. It is a hand-operated chuck, models of which are made for direct mounting on American standard spindle nose type D-1.



Detroit Hoist Monorail Tractor Pulls Heavy Loads Up Inclines

Detroit Hoist & Machine Co., 8226 Morrow St., Detroit, Mich., introduces the Trojan, electric-motor-traveled, monorail tractor. It effects a "biting action" permitting a relatively lightweight tractor to travel comparatively heavy loads up inclined monorails. This tractor is said to be applicable to traveling existing hand-operated monorail hoists by power; also to travel monorail conveyor lines.



MULTIPLE WELDER, Type MGMS2-8, performs hot-upsetting, spotwelding and projection welding of intricate parts to steel panel in one operation. One panel can be completed in less than 20 sec. Three operators required for loading. Any welding sequence can be set on telephone-jack-type control panel. Made by Sciaky Bros., Inc., 4915 W. 67th St., Chicago, Ill.

Standard Electrical Tool Makes Heavy Duty Construction on Lathe

The Standard Electrical Tool Co., 2480 W. 6th St., Cincinnati 4, Ohio, has developed extra heavy-duty construction on the Proper Speed buffing and polishing lathe to satisfy the increased capacity required when using semi-automatic fixtures. Power is transmitted to the work spindle through multiple V-belt drive. Hand-adjusting screw at rear permits placing the correct tension on the V-belt drive. The spindle is mounted in four ball bearings protected with labyrinth seals, oil reservoirs, and sight feed oil gages.

Diameter of spindle between flanges is 2 in. Sizes range: 20, 25, 30, 40, and 50 hp. Equipment includes magnetic starter having overload and undervoltage protection, with separate start-stop pushbutton station. Distance from base to inside of wheel is normally 8½ in.

Reduces Cost of Machine Base 40% by Change to Welded Steel

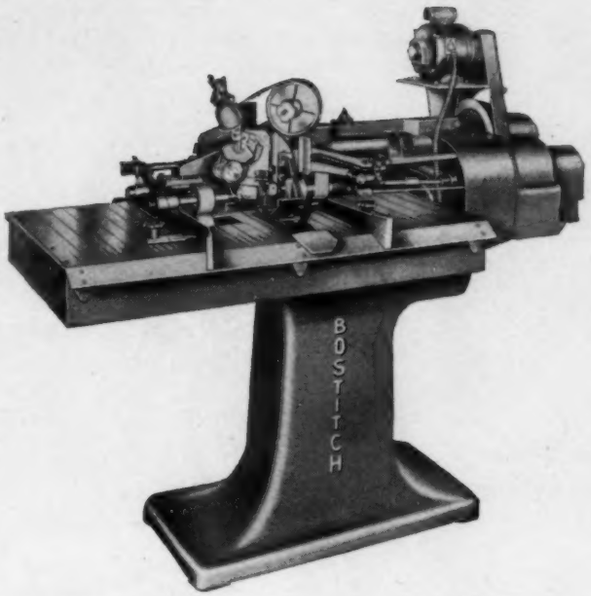


Fig. 1. The Bostitch Stitcher with conventional base.

Fig. 2. Rear view of same machine, mounted on new welded base which cost 40% less.

By R. H. Dell, Chief Engineer
Boston Wire Stitcher Company, Westerly, R. I.

CONFRONTED with ever-rising casting costs for the base of the Bostitch Automatic Box Stitcher, we decided to try welded steel design. The result is a base that costs 40% less and is 30% lighter in weight.

Fig. 1 shows the Stitcher with its original base of conventional design, and Fig. 2 shows the same machine, photographed from the opposite side, mounted on the new welded base.

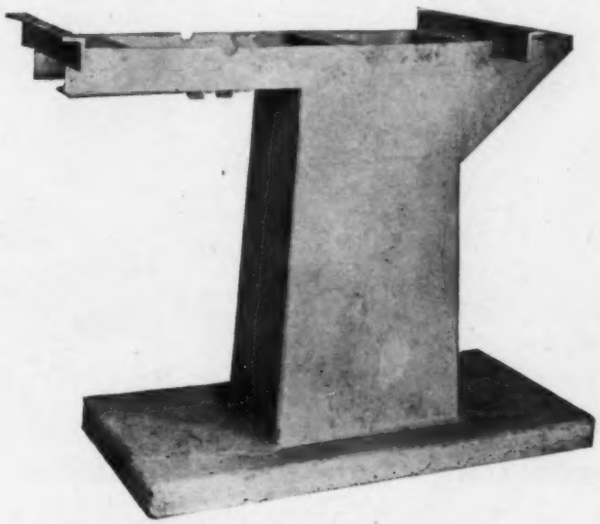


Fig. 3. The welded base without mechanism.

We had been getting the base from an outside foundry and wished to continue having it fabricated outside, so asked commercial welderies for prices on the welded base. This put the former design and the welded design on the same competitive basis.

The lowest bid on the welded base was 40% less than the price we had been paying for the former design. There was also a weight reduction of 30%, the welded base weighing only 525 pounds as compared with the former design's weight of 750 pounds.

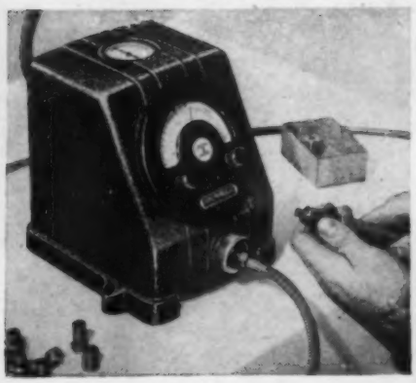
Fig. 3 is a close-up of the welded base. The main designing consideration was the great amount of pounding it takes, due to the action of the mechanism in making up to 400 stitches per minute in heavy cardboard containers.

The pedestal, of liberal dimensions to counteract vibration, is one piece of 5/16" plate. Corners are notched out, sides bent down and butt-welded at the corners. The column is four pieces of 5/16" plate, flame-cut to shape and corner welded. To minimize material at the top of the column, bare angle irons 3/8" thick are used for the table mountings. The gusset support had to be extremely strong to absorb the main impact loads, so its top support plate is 1" thick and sides and bottom are 1/2" plates.

All welds are single pass, square butt welds, not scarfed. "Fleetweld 7" electrode is used.

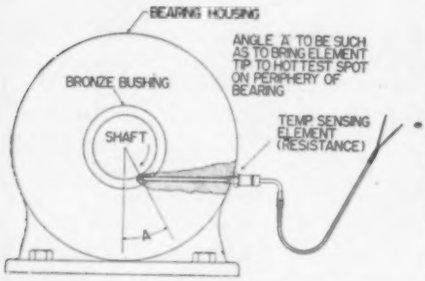
After changing to the welded base, we discovered an additional market for the same machine with the base 10 1/2" shorter. To make the adaptation, all we did was cut 10 1/2" off the bottom of the vertical column before the weldment was assembled. This flexibility of welded design gives us a further advantage.

The above is published by LINCOLN ELECTRIC in the interests of progress. Machine Design Studies are available to engineers and designers. Write The Lincoln Electric Company, Dept. 2110, Cleveland 1, Ohio.



Taft-Peirce Precision Air Gage Checks Dimensional Variations

Taft-Peirce Mfg. Co., Woonsocket, Rhode Island, announces an air gage 7 in. wide, 8½ in. deep, 7½ in. high, and weighing 12 lb. It can be moved to the job for spot-checking. Known as the CompAIRator, it contains filter and regulator, and measures without mechanical contact. The dial indicator is said to be free of point-flutter. It is a 180° linear dial, graduated in 0.00005-in. increments. Magnifications are 2500:1. Air pressure is 30 to 60 psi. Consumption is less than 10 cu. ft. per hr.


BEARING HOUSING
ANGLE A TO BE SUCH AS TO BRING ELEMENT TIP TO HOTTEST SPOT ON PERIPHERY OF BEARING
BRONZE BUSHING
SHAFT
TEMP SENSING ELEMENT (RESISTANCE)
A

Edison Monitoring System Warns Of Dangerous Bearing Temperature

Thomas A. Edison, Inc., West Orange, N. J., announces an automatic system to warn of overheated bearings. It is a multi-point temperature monitoring system capable of monitoring twenty-four bearings from each central control cabinet. Electrical-resistance bulbs with temperature-sensitive tips are used. Because they are located in direct contact with the bearing metal, existing bearing temperatures and their fluctuations are sensed rapidly. The temperature of each bearing is checked automatically every two min. Should it exceed an established maximum, an alarm is sounded. The bearing in question is located by an indicating lamp on the central control cabinet panel.

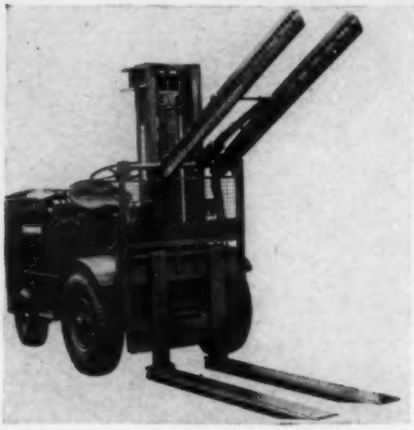
The exact temperature of any bearing can be read on the panel when desired. A modification of the system provides an automatic shut-down should a second established temperature be reached, which is useful at unattended stations.

Journal Dia. Measured Without Removing Crankshaft by Tumico

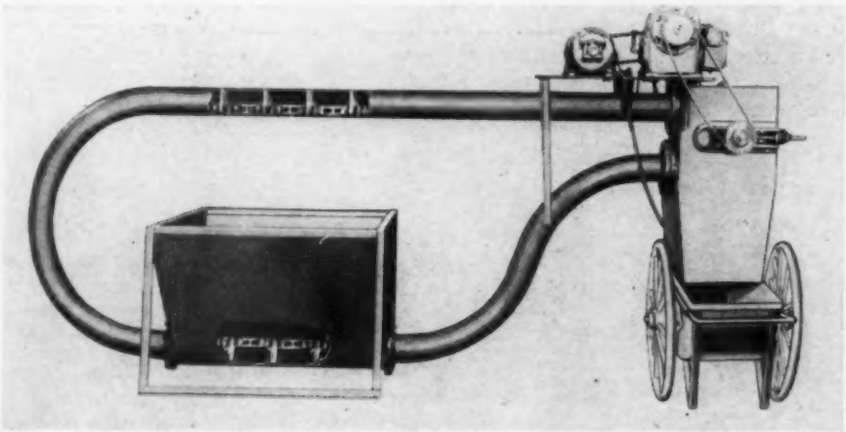
A direct-reading crankshaft micrometer making it possible to measure journal diameters without removing the crankshaft from the engine block is made by Tubular Micrometer Co., St. James, Minn. It is recommended for use on all types of crankshafts, although primarily designed for combustion engines, and is said to be accurate to 0.001 in. Direct reading is said to eliminate 50% of possible error. Capacity is from 2 to 3 in. in English calibration or 50 to 75 mm. in metric.

Ripley Timatron Controls Flow Of Current in Timing Spot Weld

Ripley Co., Inc., Middletown, Conn., announces the No. 52D Timatron, an electronic welding timer that gives control to flow of current in timing the weld. Once set for a special metal thickness, timing becomes automatic throughout run. The control has a capacity to time any machine up to 10 kva. and is adjustable from 0.1 to 5 sec. by hand control. Size is 4¾ x 5⅛ x 9 in. high.



CLAMP-ARM accessory for fork lift trucks by Towmotor Corp., 1226 East 152nd St., Cleveland 10, Ohio. Sponge rubber inserts along bottom edge of arms are said to prevent shifting or slipping of large flat loads. Clamp arms are hydraulically operated to grip load. Capacity of this unit is 4,000 lb. at 25 in.; lifting range is 114 in.



Honan-Crane's Houdaille Conveyor Removes Settling-Tank Sediment

The Honan-Crane Corp., 909 6th St., Lebanon, Ind., announces the Houdaille conveyor, used for automatic removal and transfer of sediment from settling tanks without removal of fluid. It is an endless motor-driven link-chain, operating through the V-bottom of the settling tank, and trapping the sediment between flights. It is then conveyed through a 4-inch pipe-line to a collection and disposal point. Speed is 2 to 3 fpm.

New NATCO A-33 Light Sensitive Multi Driller or Tapper

for drilling or tapping 1/16" to 1/4" holes in small work

IN CAST IRON, STEEL, ALUMINUM, PLASTIC OR WOOD

With or without air operated automatic rotating table

A hit at the Machine Tool Show

The new NATCO A-33 Light Sensitive Machines offer maximum production on light work where super sensitive operations and high speed are of paramount importance. These NATCO machines offer flexible spindle arrangements for up to ten spindles. Spindle speeds from 650 to 3550 RPM are provided by quick-change sheave arrangement. Close control and high speed are features of all three models of the NATCO A-33 Machines providing the following feed arrangements: (Model A-33A) Hand and Foot Feed; (Model A-33A) Combination Hand and Foot and Air Oil Feed; (Model A-33B) Air Feed. Write Dept. A for NATCO Bulletin 247.

NATCO A-33A Combination Hand and Foot and Air Oil Feed Machine illustrated can be arranged for both light precision drilling and tapping.

NATCO DRILLING, BORING, TAPPING & FACING MACHINES

NATCO

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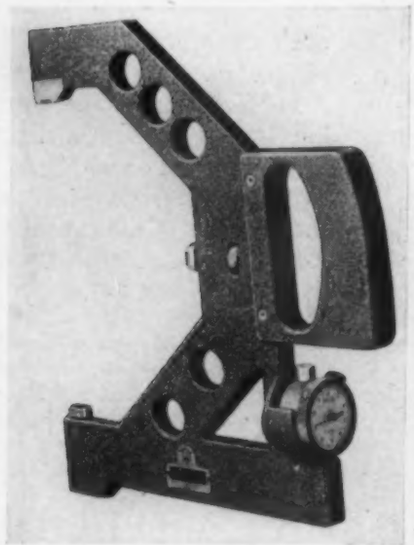
Call a Natco Field Engineer

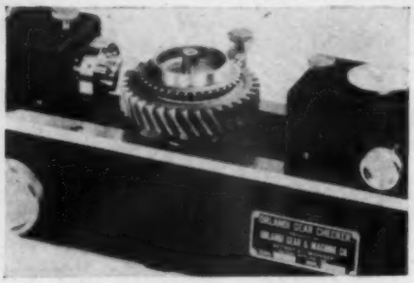
Ajax-Northrup Converter Capable Of Sustained Operation at 20-kw.

Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J., announces a self-tuning high-frequency converter having a 20-kw. rating for induction heating. It has specially tipped copper electrodes in the spark-gap chamber. It can be used for steel melting up to 30 lb., and for melting gold, silver and other precious metals. It is capable of sustained operation at its 20-kw. rating. Power supply to the converter is single phase, ac., usually 208, 220 or 440 v.



Dial Snap Gage Made by Nilsson Incorporates Adjusting Stud

Nilsson Gage Co., Inc., Poughkeepsie, N. Y., announces the Nilco dial snap gage. Machined from rolled magnesium, and with 45° angles to provide rigidity, it is designed to minimize the dimensional changes caused by variations in temperature. A vernier-type adjusting stud permits ¼-in. adjustments to be made in the gaging pin or movable anvil. The adjustment can be locked, with the gaging pin still free for checking.



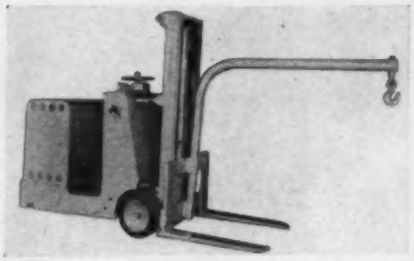
VISUAL CHECKING of helix angle with Orlandi Gear Checker has been made possible by use of simple movable and adjustable head, enabling operator to check as rapidly as he can lift one gear and set another on resting plate and locating pin. Michigan Tool Co., Detroit 2, Mich.

Ampco Sil-Trode Electrode Welds Silicon-Bronze Parts

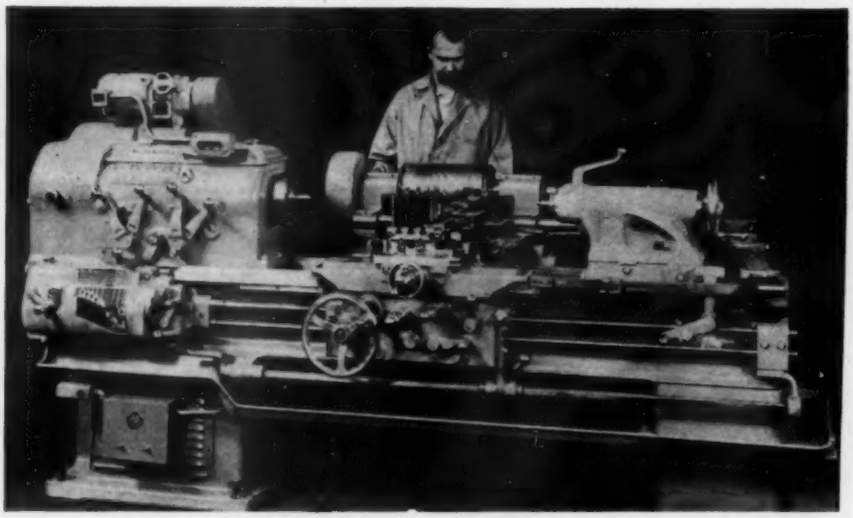
Ampco Metal, Inc., Milwaukee 4, Wis., announces a shielded-arc silicon-bronze electrode operating on reverse-polarity dc. called Sil-Trode. It was developed for use as an electrode of similar composition to the parent metal when fabricating and repairing silicon-bronze parts. It is said to develop less "heat" in the joint, and is available in five diameters from 3/32 to ¼ in.

Improved Wilson No. 512 Electrode Eliminates Preheating Necessity

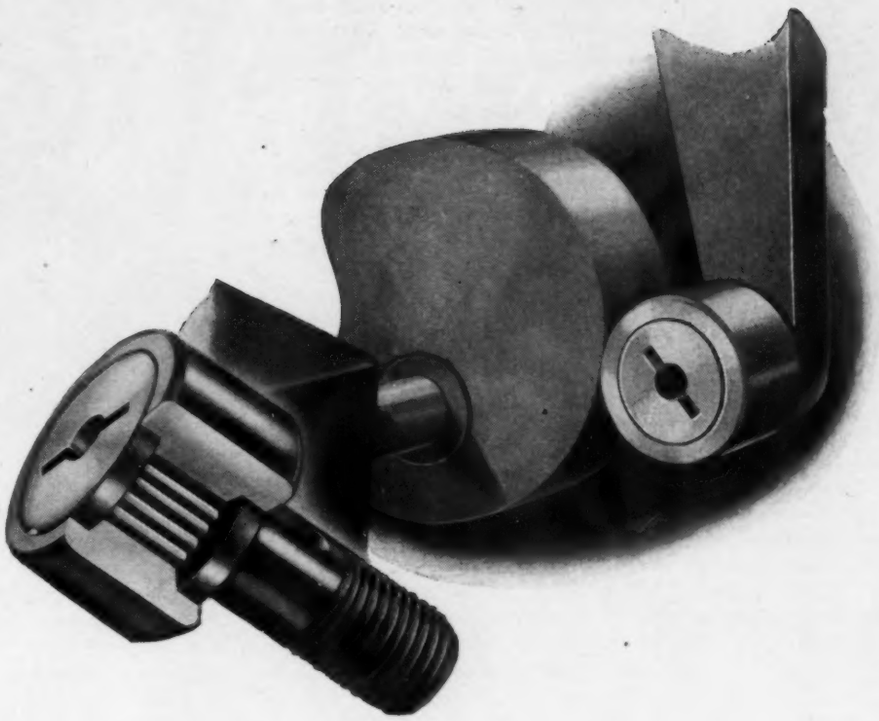
Improved Wilson No. 512 all-position, mild-steel electrode is announced by Wilson Welder and Metals Co., Inc., Dept. 1543P, 60 E. 42nd St., New York 17, N. Y. It can be used on ac. and dc. reverse-polarity current. It is said that preheating is no longer required to obtain porosity-free weld deposits. Low hydrogen content is said to make possible the production of enameled surfaces without any heat treatment prior to enameling.



CRANE-ARM attachment built in standard models in increments of 6 in. from a minimum length of 24 in. to a maximum of 72 in. is announced by Lewis-Shepard Products, Inc., 301 Walnut St., Watertown 72, Mass. Material is picked up with a sling attached to the crane hook and may be moved by the crane arm or placed on a pallet or skid platform



ENGRAVING LATHE, made by Monarch Machine Tool Co., Sidney, Ohio, is said to turn shapes and designs heretofore only produced by hand engraving. Also will perform all operations that can be done on standard Shapemaster lathe. Master record shape can be transmitted to work same size or any ratio of reduction. The machine can produce its own master record from the original hand-worked model. Swing over bed is 20½ in., distance between centers is 48 in., and max. dia. swing between centers is 4¾ in. Max. dia. that can be engraved is 15 in.; max. length is 9 in.



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in cam follower applications, wear must be kept to a minimum... a problem which grows with increasing loads and speeds. The anti-friction efficiency of

Torrington Cam Follower Needle Bearings...

helps to assure continued accuracy of operation of many types of machines. They have a high radial capacity provided by a full complement of small diameter rollers—backed up by sturdy outer races. They are compact in design, occupy little space, retain and distribute lubricant effectively to all surfaces.

Torrington Cam Follower Needle Bearings are made in a wide range of sizes, one of which may be the solution to your cam roller problem.

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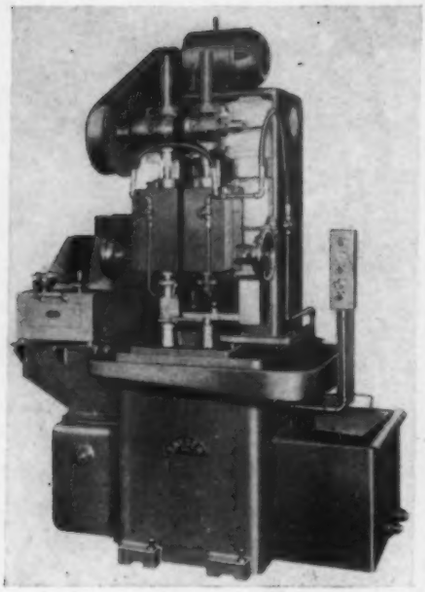


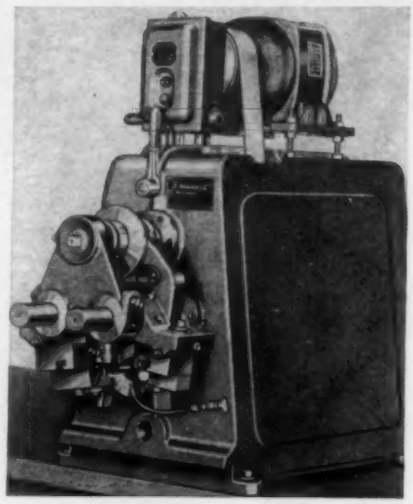
ROD BALANCER makes possible automatic balance milling of automotive connecting rods, with the exception of setting quills for depth. Two 16-sec. machining cycles are required for each rod, exclusive of loading and weighing. Clamping is automatic. Made by Snyder Tool & Engineering Co., Detroit 7, Mich.

Lewis-Shepard JackTractor Built to Tow Trailer Trains

The JackTractor unit, an addition to the platform and pallet models of the power Jacklift, has been announced by the Lewis - Shepard Products, Inc., 297 Walnut St., Watertown 72, Mass. It is built to tow trailer trains and can also be used as a pushing unit. Powered by the 6000-lb. capacity power JackLift master-drive unit, it has a maximum draw-bar pull of 500 lb. Vertical-handle operation, and the elimination of collector rings and brushes for transmitting power, are two of the features.

Controlled Vibration Breaks Chips On Standard's No. 2 Screw Machine

No. 2 automatic screw machine made by Standard Machinery Co., 1565 Elmwood Ave., Providence, R. I., will accommodate all normal screw-machine operations on bar stock to 1-in. dia., with the exception of thread cutting.

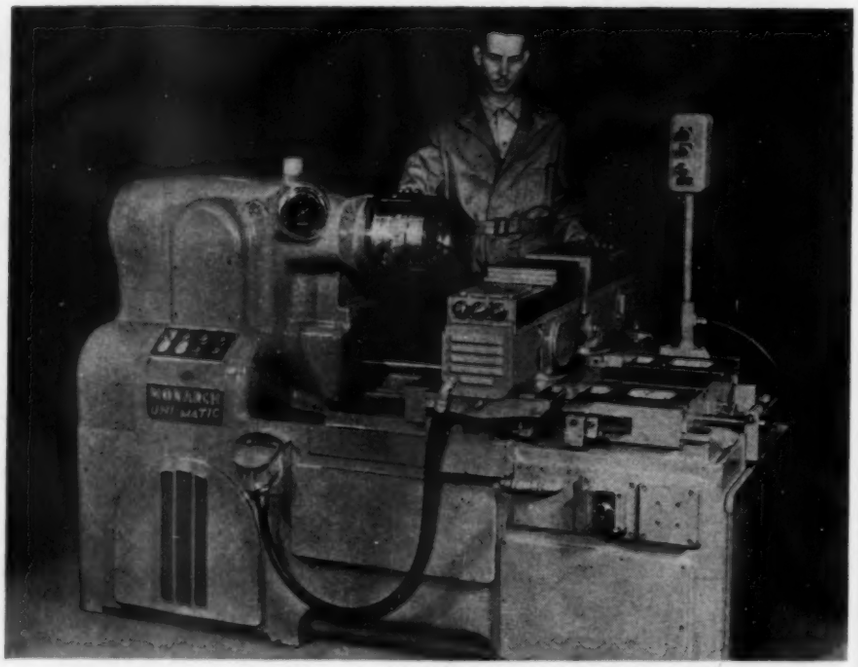


The machine is set up on 24-in. spindle centers. It offers a method of driving the feed camshaft that is said to eliminate the formation and clogging of long chips. Twice in each revolution of the spindle, the rotation of the feed camshaft is interrupted while it vibrates harmonically with an amplitude sufficient to break each chip. This results in an intermittent feed in which each chip is broken as it is formed.

The basic machine performs two separate forming operations or a roughing cut, followed by a finishing tool and cut off. Attachments are available for drilling or boring.

The feed camshaft can be disengaged instantly and rotated slowly by hand for setting of tools. Bar stock is introduced to the feed tube by the operator from the front. Butt ends are ejected by manual control. The machine is powered by a 1¼-hp. motor with manual starter.

The machine can be set up in batteries and it is said that one operator can handle six units, including feeding of stock and maintenance of tools. An automatic chip and work conveyor can be provided.



UNI-MATIC LATHE equipped with hydraulic table now can rapidly handle parts that require a large amount of loading clearance. Type B Uni-Mats mount on the table, which has 12-in. longitudinal movement. Feed rate of table is ½ to 15 ipm., and traverse rate is 40 ipm. Movement of table can also be used to feed tool into work. Machining cycle is automatic: operator loads work, starts cycle, removes work at completion. Unit is manufactured by Monarch Machine Tool Co., Sidney, Ohio

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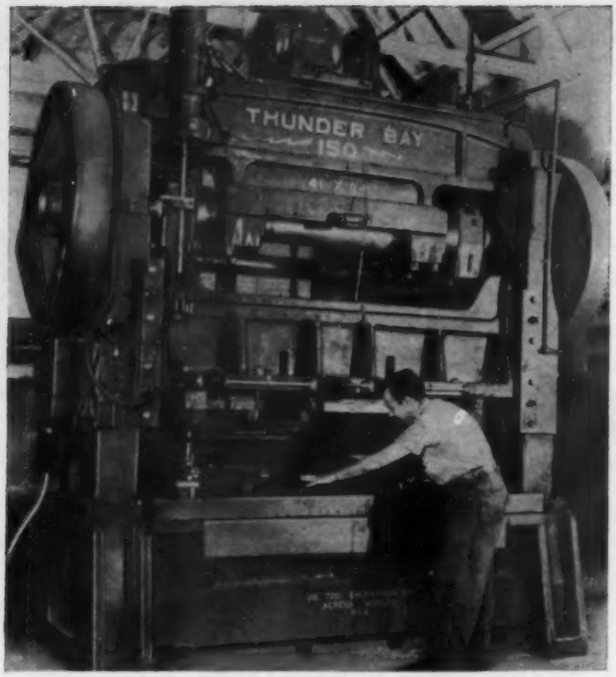
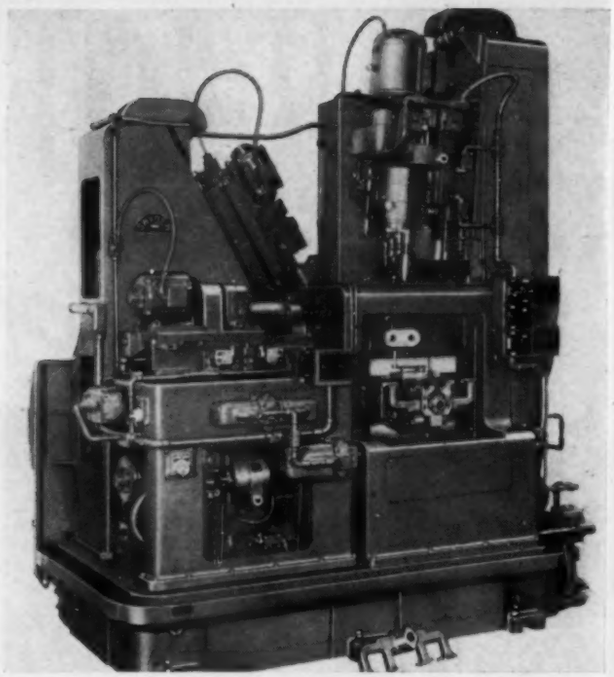
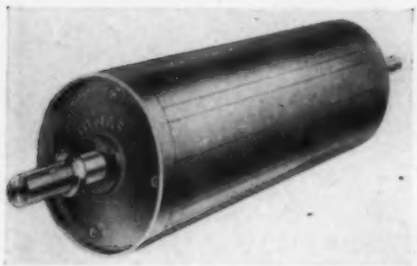


150-TON PRESS has 41x84-in. bed size. Double back gearing and Rockford friction clutch are features of the Thunder Bay line. Other models are 100, 150, 200, 250, and 300 ton, in a variety of bed sizes. Made by Die Tool Engineering Co., 18800 Hawthorne Ave., Detroit 3, Mich. Weight of illustrated unit is 37,000 lb.



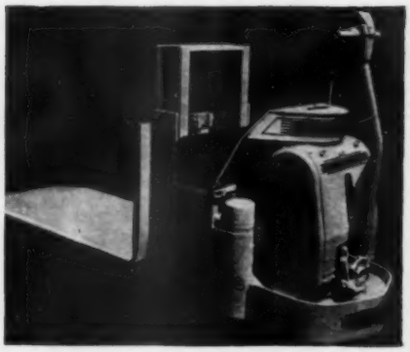
DRILLING, SPOTFACING, chamfering, and combination drilling and tapping operations on cast-iron intake manifolds are performed by automatic machine at production rate of 160 pieces per hr. Work-cycle consists of load, index, rapid approach, feed and rapid return. Made by Snyder Tool & Engineering Co., Detroit 7, Mich.



PERMA-PULLEY, permanent magnetic pulley with Alnico poles made by Dings Magnetic Separator Co., Milwaukee, Wis., is available in 53 sizes ranging from 12-in. dia. x 12-in. width to 30-in. dia. x 60-in. width.

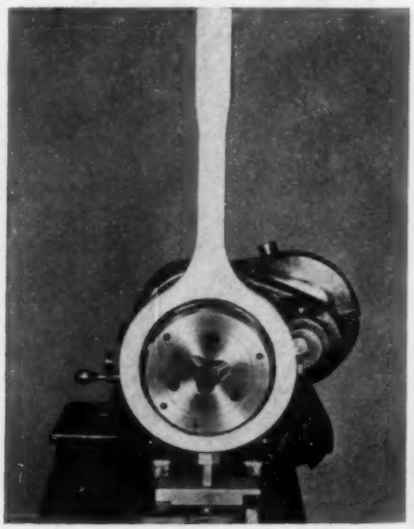
R2V Buffing, Polishing Units Made with Two New Motor Sizes

Two 3-hp. or two 10-hp. motors have been made available as part of Type R2V buffing and polishing machines by Standard Electrical Tool Co., 2480 W. 6th St., Cincinnati 4, Ohio. Each side has its own spindle allowing each workman to operate independently. Turning of the Speedial control changes the spindle speed and this instantly is recorded on the dial. Speed range is from 1500 to 3000 rpm.



Hyskid Transporter Raises Platform Net Lift of 13 in.

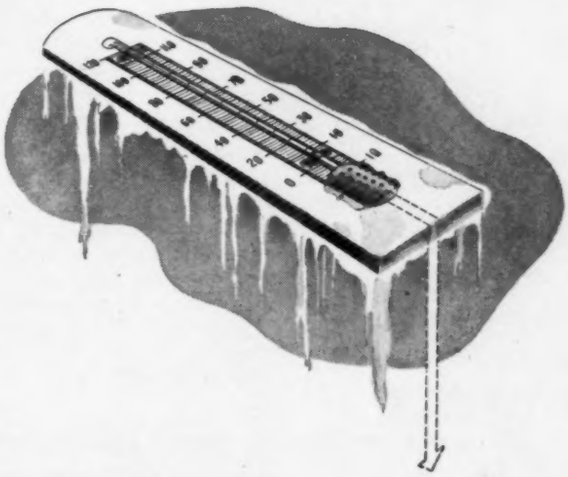
The Automatic Transportation Co., 149 W. 87th St., Chicago 20, Ill., has introduced the Hyskid Transporter which makes it possible to handle skid platforms of all heights with a single all-purpose motorized handtruck. It will raise a full-capacity load of 6000 lb. at a rate of slightly more than 1 in. per sec., and is able to raise the full 13 in. from low position to high position in 12 sec. (loaded) or 8 sec. (empty).



SPEED CHUCK, Model No. 3E1 Fry Multi-Duty, made by Airo Products Co., 2938 Denby Ave., Los Angeles 26, Calif., is said to combine the advantages of both collet and jaw chuck, and to be adjustable to concentric or eccentric work. It can be opened or closed in motion. Capacity is ⅛ to 1 in. round, ⅞ in. hexagon, and ¾ in. square

for HIGH STRENGTH

at low temperatures



REVERE COPPER and COPPER ALLOYS

● Revere Copper and copper-base alloys are a "natural" when dealing with applications involving subnormal temperatures all the way down to liquid oxygen (-306°F.) and below.

Copper and its alloys possess the valuable characteristics of becoming increasingly stronger, the lower the temperature, *with no attendant loss of ductility,* and *with no tendency toward brittleness or "notch-impact" sensitivity.*

For example, note the rise in strength, ductility *and* resistance to impact for two copper and brass alloys:

Alloy	Temp. °F.	Tensile Strength, p.s.i.	Elongation % in 2 in.	Impact Resistance, Kg-m per sq. cm.
Electrolytic				
Tough Pitch	68	58,700	8.4	6.6
Copper (Cold Rolled Strip)	-295	64,800	11.2	7.4
Yellow Brass	73	85,400	6.3	8.1
(Cold Rolled Strip)	-295	102,900	10.1	9.4

Other Revere Alloys, such as Herculoy (High-Silicon Bronze, A), show similar improvement in these important mechanical properties.

If you make or are contemplating the manufacture of liquid oxygen equipment, you will be playing safe to specify copper-base alloys. Get in touch with Revere for full information on the low-temperature physical characteristics of Revere metals.

• • •

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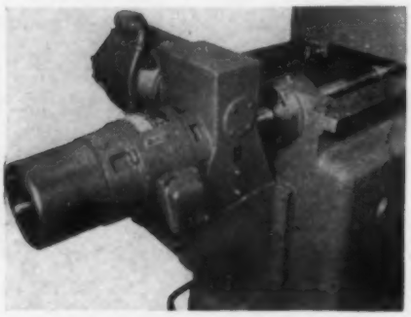


Machine-Tool Feeds Controlled By GE's Feed-Traverse Drive

A feed-traverse drive for machine tools, composed of an ac. traverse motor and a dc. feed motor packaged into one unit, has been developed by General Electric Co., Schenectady, N. Y. The drive is completely factory assembled, and produces a wide range of stepless feed and traverse speeds with close speed control. Feed speed ranges of 20:1 or more can be provided.

Both motors in the unit drive into a differential gear which has a single output shaft. The gear output shaft is so constructed that in many cases it can be coupled directly to the leadscrew of the machine. To install, the gear end of the unit is simply mounted on the machine to be driven. The unit can be inspected and oiled without removing it from the driven machine.

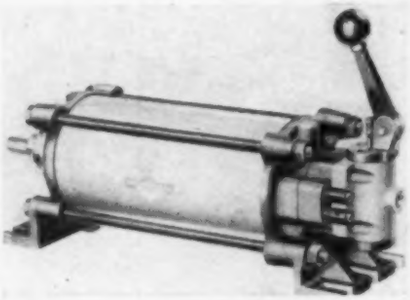
Cleveland Punch and Shear Makes Drum-Type Friction Clutch, Brake

The Cleveland Punch and Shear Works Co., Cleveland 14, Ohio, has developed a drum-type air friction clutch and brake. The clutch and brake can be applied to any size press, new or old, either flywheel or back geared, and is mounted directly on the drive shaft.

It is said to be one-fourth the weight of a conventional-type disk friction clutch, thus insuring quick starting and stopping, and to require less horsepower to operate. The clutch is self-adjusting and can be serviced without removal from the press. The clutch and brake is a combined unit of one-piece construction and cannot become separated while the press is in operation. Thus the possibility of both the clutch and brake becoming engaged simultaneously is eliminated.

Alox Universal Additive 162 Improves Lubricity of Oils

Alox 162, a universal oil additive said to improve the lubricity of all types of lubricating oils and increase their life under high temperatures and pressures, is available from Alox Corp., 3934 Buffalo Ave., Niagara Falls, N. Y. It provides wetting characteristics said to make it possible for the oil to completely coat the bearing surface with a closely bonded continuous film.

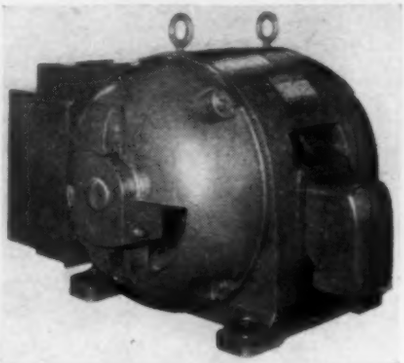


Bellows BM15 Develops Piston Thrust 15 Times Line Pressure

A heavy, reciprocating, non-rotating air motor, known as BM15, has been introduced by The Bellows Co., 222 W. Market St., Akron, Ohio. With 4½ in. bore, it develops a piston thrust of 15 times air line pressure, from any given line pressure up to 175 psi.

The valve and all operating controls are integral with the unit. The valve-operating lever is adjustable to work from any angle in any plane. Adjustable controls to regulate the speed of the piston in either or both directions are integral with the motor itself, eliminating the necessity of adding special speed-control valves to the air line. One air connection is required and can be a flexible hose.

The BM15 is available in stroke lengths of 1½, 3, 6 and 9 in. Many other stroke lengths are available on special order.



GE Tri-Clad AKC Converter Powers High-Speed ac. Motors

A power supply for high-speed ac. motors for applications on grinders and drills has been announced by the General Electric Co., Schenectady, N. Y. Called Tri-Clad Type AKC inductor frequency converter, the self-excited, self-driven machine provides three-phase power at frequencies from 360 to 2160 cycles, ½ to 150 kw. It consists of a cast rotor revolving in a stator having two windings. Control usually consists of a magnetic switch with conventional thermal-overload relay on the input, or primary side.

Colmonoy Plastic-Bonded Rod Extruded in Two Diameters

Wall Colmonoy Corp., 19345 John Rd., Detroit, Mich., announces the availability of Colmonoy plastic-bonded rod in 5-lb. coils. This rod is supplied in ⅛- and 3/16-in. dia.

Colmonoy plastic-bonded rod is composed of powdered Colmonoy No. 6, combined with a plastic binder, and extruded to the above sizes. As the rod passes through the flame of the metallizing gun, the plastic burns out, leaving the Colmonoy particles deposited on the surface. Thickness of deposit is from 0.010 to 0.125 in.

VICKERS Variable Speed HYDRAULIC TRANSMISSION

1/2 Horsepower

(PATENTED)

PRICE $75.00

Here is a compact, sturdy, variable speed hydraulic transmission for machinery drive. Any speed from zero to 1750 rpm—*in either direction* can be obtained without reversing the driving motor.

Effortless finger tip speed adjustment over the entire range is obtained by the handwheel control and the selected speed remains constant. A hydraulic servo control mechanism is also available. The full output torque is available throughout the speed range and the built-in automatic overload protection permits stalling without causing damage.

The Vickers hydraulic transmission is automatically pressure lubricated by the power transmitting medium (oil) for long and trouble-free operation.

Contact the Vickers Sales Engineering and Service Office nearest you for complete information.

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

MILLIVOLTMETER pyrometric indicator known as Veri-Tell is announced by Taco West Corp., 2620 S. Park Ave., Chicago 16, Ill. Available in Model I which includes thermostatic automatic cold-junction connection; or in Model H with Hyper compensator, useful where narrow or negative scale ranges are required

HPL's Expander for Leather Cup Packings Produced in Strip Form

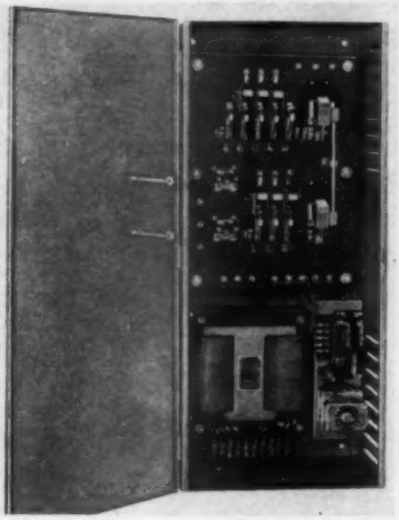
HPL Mfg. Co., 2013 E. 65th St., Cleveland 3, Ohio, announces an expander for leather cup packings. It is produced in strip form and made of heat-treated beryllium-copper material. It is said to be highly impervious to corrosion and to maintain constant contact between packing seal lip and cylinder wall on pneumatic and hydraulic equipment. It is designed for air-hydraulic, fluid-sealing or any other sealing problem, and will fit any cup dia. 2 in. and over.

Ransburg Safety Control Prevents Sparks in Electrostatic Painting

Harper J. Ransburg Co., Indianapolis 7, Ind., announces an additional safety device for its electrostatic spray-coating and dip-detearing processes. The safety control is an electronic "spark-guard" which is able to anticipate an accidental short and de-energize the electrostatic field. It will automatically stop the equipment, should a piece accidentally approach the discharge electrode, by use of electronic relays. This device also activates a bell and lamp to signal the operator and can be wired to stop the conveyor or other equipment.

Cresol Cutting-Oil Additives Announced by Lubricants, Inc.

Lubricants, Inc., Fisher Building, Detroit 2, Mich. announces cutting-oil additives Cresol Z-2 and Cresol Z-2-A, designed to assist in the production of cutting-oil coolants, drawing compounds, metalrolling, forming and extreme-pressure lubricants. They are modified sulphur-chlorides, non-vesicant, and are claimed not to cause, but prevent skin infection. Both additives are said to be miscible in all proportions in all petroleum fractions.



Ward Leonard ac. Motor Starters Reduce Inrush Starting Currents

Ward Leonard Electric Co., Mount Vernon, N. Y., introduces Bulletin 4051 ac. automatic motor starters. They are non-reversing auto-transformer type for use with single-speed, two- or three - phase squirrel-cage induction motors driving pumps, fans, compressors and other equipment. They are used where inrush starting currents must be reduced or where motor starting torque requires adjustment.

The drip-proof enclosed starter is arranged in three removable sections: contactor panel, timer panel, and multi-tap auto-transformer. It is made in standard sizes for use with squirrel-cage induction motors to 100 hp., 550 v., 60 cycles.

Motor-Starting Capacitor Line Made in Five Ratings by Aerovox

A line of bracket-mounted, armored, motor-starting capacitors, Series SRVC, is announced by Aerovox Corp., New Bedford, Mass. These capacitors are built compactly, measuring 2 1/16-in. dia. by 2⅞ to 3¾-in. long, depending on voltage and capacitance ratings. Standard ratings are 110, 220, 330, 440 and 660 v. ac., while capacitances range from 1 to 8.5 mfd.

Chemco Products' Unisol Liquid Strips Enameled, Painted Parts

Unisol Liquid, for stripping wood or metal enameled and painted parts, has been announced by The Chemco Products Co., Inc., Chicago, Ill. This solution was developed to provide a fast-acting, non-toxic stripping and cleansing agent. Five minutes immersion in the non-inflammable solution is said to leave any painted or enameled part completely cleaned, ready for repainting.

It is said that Unisol Liquid will not harm operators' hands or clothing, that it will not lose strength, and that it can be reused by merely filtering paint film from tank.

Dow Corning Silicone Oils Used For High-Temperature Lubrication

Dow Corning Corp., Midland, Mich., announces DC 710 Type silicone oils for lubrication at temperatures from 10 F. to 500 F. They may be used in timing mechanisms, precision instruments and oven conveyors, and are said to have exceptional heat stability combined with resistance to oxidation, freedom from gumming, water repellency, low volatility and high flash points.

Stepless Input Controllers Announced by Thermo Electric

Thermo Electric Mfg. Co., 461 W. Locust St., Dubuque, Iowa, announces a stepless input controller and temperature indicator which provides both variable control and indication of temperature. A thermostatic switch controlled by a knob can be set to regulate the current input into the heating equipment anywhere from 5 to 100% time "on." The unit automatically compensates for changes in line voltage. The pyrometer is calibrated in both Fahrenheit and Centigrade scales to 2000 F. and 1100 C. Size is 9 in. wide, 5 in. high and 8 in. deep, and weight is 6 lb. Eight models are available. The unit is suitable for desk or wall mounting.

Line reamer bushings, diameter 2.375", accuracy held to .0001".

Cast iron Valve Stem Guide. ½ to one thousandth removed—220 pieces per hour. Better finish and straighter hole.

Carburetor Idler Valve Jet. Hole is honed after reaming for smooth action.

Stainless Steel Load Compensator Valve Seat. Hole is honed to .0002" limit.

Inner Bearing Ring. "Accurately removes last 'tenth' of stock."

Diesel Engine Fuel Injector Cylinder. "So accurate that a piston can be fitted within .00005"."

Universal bearing honed to 10 micro-inch finish gives longer service.

Compressor Yoke. Alignment maintained and better finish produced.

Hydraulic Brake Cylinder. Produced a straighter hole in one-third the time required for lapping.

Aircraft Piston Pin. Sunnen honing is twice as fast and smooth surface reduces danger of stress cracks.

Aircraft Carburetor Operating Valve Sleeve. Sunnen honing eliminates distortion from assembling operation.

Hydraulic Control Bushing. Honing gives straight round hole after rough reaming.

Valve Tappet Roller. Honed after grinding to give 100% bearing surface.

Bearing. A very small part. 2 micro-inch finish necessary.

SUNNEN *Precision* HONING MACHINE

Will Solve Your Problems of Producing Straight Round Holes... *Quickly, Economically*

If your plant produces parts of steel, cast iron, aluminum, bronze, plastic, ceramic or glass—and if these parts have holes that must be accurate and smooth, the Sunnen Precision Honing Machine will save time and money for you. These machines are being used in hundreds of factories to size and finish holes from .120" to 2.625" in diameter in tools, dies, jigs, fixtures, thousands of production parts—and for maintenance and salvage operations.

Accuracy is guaranteed within .0001"—more accurate than lapping and from 3 to 10 times as fast. A complete range of honing stones is available to produce any micro-inch surface finish desired. In hardened steel, a finish of 2 to 3 micro-inches can be obtained.

In addition, the Sunnen Precision Honing Machine maintains accurate alignment between tandem holes, operates without jigs or fixtures, can be set up to operate in less than one minute, corrects errors of out-of-round and taper, is easy to operate and low in cost.

Find out how you can use the Sunnen Precision Honing Machine in your plant. Write today for literature—or ask a Sunnen engineer to show you its advantages.

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You'll do dozens of checking and setting-up jobs easier and faster with the Lufkin Universal Indicator. Clamp it in a chuck or surface gage and apply the hardened point to the work from practically any angle — the universal joint makes it simple! Easy to read, too, because this is the indicator with two reading faces — one is always in plain view for direct reading. All working parts hardened. Complete with standard bar for general use and special attachment for use with tool chuck and surface gage. Your dealer has the Lufkin Universal Indicator. Write for catalog

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ROUND TABLE Discussion

CAN YOU AID THE LEMON?

Lemons can be divided into two main groups: the helpless and imbecile, and the willful and perverse. Much can be done for and with the first group; practically nothing with the second.

From the remark, "But this guy has made trouble on every job he has been on," it would seem that the individual we are considering falls into the latter group.

The helpless and imbecile can be helped by finding them the simplest jobs, giving them their instructions in the plainest terms, and giving them close and contant supervision. They are never likely to be a really good investment, but they are an integral part of the community and it is desirable to insure that such abilities as they do possess are put to good use.

The willful and perverse type are troublemakers and anti-social. The type, once it is recognized, should be shot out through the gate with a maximum of velocity and a minimum of delay. It is a type which will only learn from bitter adversity.

K. N. Harris
Harrow, England

•

WHOSE JOB IS LABOR RELATIONS?

Are not good labor relations largely a matter of common sense, decent thinking, and leadership? If this can be accepted as a working hypothesis, it would follow that the foreman who was always seeking, or needing, the help of some external influence to keep peace in his department, would be demonstrating his lack of one or more of these fundamental qualities. Men of this type create the need for labor relations.

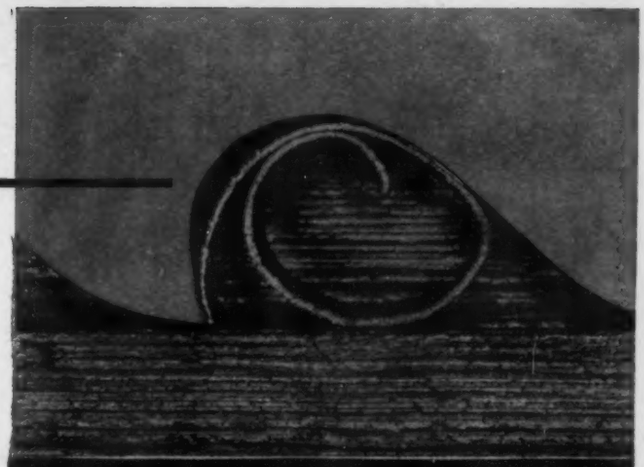
Should it not be a first consideration to select men as foremen who are thought to have the requisite qualifications?

At one time it was believed that the truly successful foreman must have an aggressive manner. It was men of this class which first made labor relations necessary. Then bluster was held to be a sign of strength.

The foreman who has the confidence of his men needs no help in their control. It may even be, should trouble arise through extraneous in-

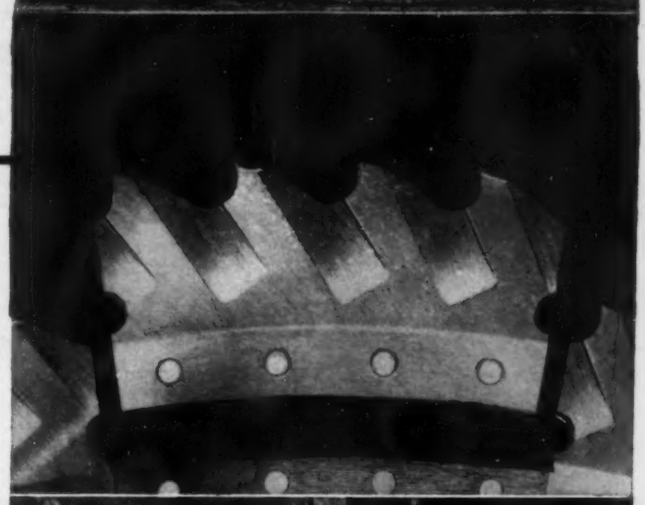
this tooth

This is Atkins "Curled-Chip" tooth—the tooth with a curved cutting face that LIFTS chips with a smooth continuous cutting action...curls them up to be expelled from the gullet like a suddenly released clockspring. Result: faster cutting with less power, heavier feeds, truer cuts.



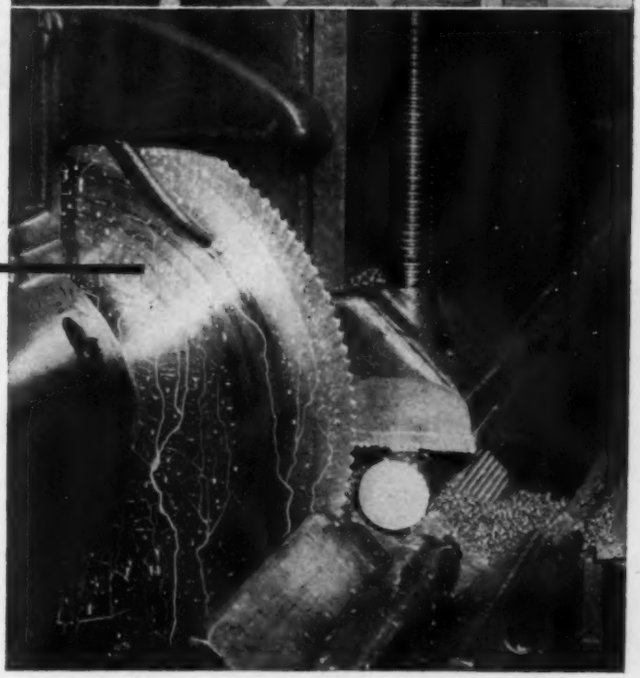
in this segment

"Curled-Chip" teeth in segments, as shown, permit a standard cutting width consistently narrower. Segmental construction gives great resistance to the shock of heavy duty work. Worn-out teeth can be easily and quickly replaced without discarding the saw disc.



acts like this to cut costs

This combination—"Curled-Chip" teeth in high speed steel segments—produces results like these: 100 seconds per cut on 5½" C. R. steel...16 sq. in. per minute on SAE 1020 steel...10 seconds per cut on 2½" electric cast steel...3 minutes per cut through 18" by 18" aluminum ingots...25 seconds to cut 14 nested bars, 1⅝" SAE-1335. With performance like that to shoot at, we suggest you discuss your heavy-duty metal problems with an Atkins Cutting Engineer.



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fluences, that such a foreman would succeed when labor relations failed. Both foremen and labor relations deal with men. If one fails, where the other succeeds, it can be only that the one is not as good as the other. Ed recognized that Jimmy Doyle was a better man than he, and that labor relations were better than both.

Can square pegs ever fit round holes? Is this not a question of foreman training?

J. E. Powell
Lincoln, England

•

VACATION—A LOAF OR A LEAVE?

I'm one of the guys who took an extra job instead of loafing around for a couple of weeks. So what? I happen to have six kids and believe me, brother, it takes cartwheels to keep them going these days. Oh, I could have packed them into the old jallopy and taken them up to Mosquito Lake—and I mean 'mosquito', brother—like I did last year, but . . .

After experiencing a blowout, which whirled the old bus around 265° counterclockwise and finally landed it in a deep ditch, I had to walk about four miles in the blazing sun to get a farmer with a team of horses to help pull us out. We arrived at our anticipated paradise just as the original flying disk was sticking his nose up over the horizon. It then being too dark to pitch our tent, we managed to doze off now and then until daybreak.

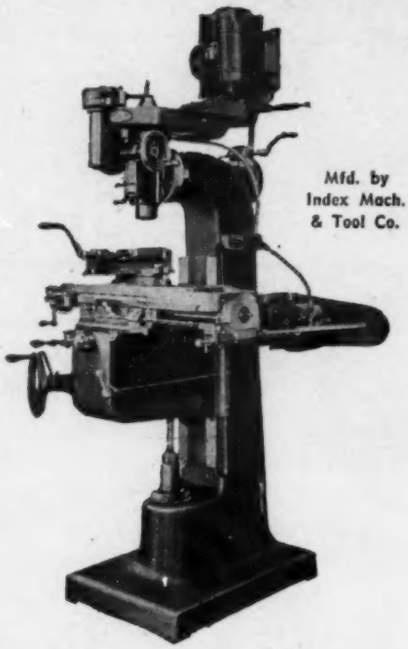
Yes, sir, it was an agreeable change from the old shop! One of the kids damn near drowned; two led my wife and me a chase trying to find them in the knotted willows and almost impenetrable bullrushes after dark; and to top things off, I had to get my line caught in a snag and lose my prized sinker that I had whittled out of a piece of 88-10-2 when the boss wasn't looking. Is it any wonder that my wife and I broke off diplomatic relations three times during that "restful, relaxing" ten days and declared open, all-out warfare twice (once as we were packing up to come home and again after we got in)?

I came home from that little 'rebuilding' jaunt, looking like a piece of high-speed steel that had soaked overtime at 2500 F, and spent a couple of agonizing days in bed getting back to normal.

So I says to my wife this time, "Well, Mabel, what's it going to be this year, Mosquito Lake or what?" She frowns at me as she stands

INDEX MILLS

will help you on your tool, die and production work. In addition to micrometer dials on screws, verniers are standard equipment for cross and longitudinal locating. If finer precision is desired, rods and indicators are available. These in conjunction with power feed to a precision ball bearing spindle make a very versatile machine for milling, drilling and boring. ***Literature promptly mailed on request.***



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12" Tool Room Rotary Table

A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

For use on Index Mills or any other machine that will accommodate a 12" table.

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A unit of exceptional energy is the Gerotor Hydraulic Pump Unit . . . capable of delivering a steady oil flow at continuous pressures up to 1000 p.s.i. (1200 in some pump sizes). Models available for one or two hydraulic circuits . . . tank capacities from 4½ to 100 gallons. Each unit complete with Gerotor pump, tank, relief valve, gauges, filter, coupling and piping. Write for data on the specific application you have in mind. Gerotor May Corporation, Baltimore 3, Md.

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OPEN BACK INCLINABLE

5 TON - 10 TON - 18 TON - 30 TON

No. 3-30 TON

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Press-Rite Presses are built in the following sizes, 5 ton, 10 ton, 18 ton, and 30 ton. All are open back inclinable models, equipped with a new positive single stroke attachment. Precision built for blanking, drawing, forming, punching, riveting and stamping.

For complete information write to Department A-23.

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BAND SAW

BIG SAVINGS in cutting off metal to lengths. Extremely fast because of continuous cutting action, automatic operation and quick set-up. Cuts with precision accuracy.

Wet Model suitable for production cutting at highest speeds. Dry Model for occasional cutting. Requires only a small investment to MODERNIZE YOUR METAL CUTTING.

MANY SPECIAL FEATURES

- Cuts tubes, rods, angles, heavy round or flat stock.
- 8" x 16" throat handles 95% of all cut-off work.
- Entirely enclosed saw frame for safety.
- Blades mount from top for easy servicing.
- Cutting action always visible from above.
- Interchangeable motor mount takes any motor in emergency.
- Off-the-floor built-in coolant.
- Portable—for plug-in operation anywhere.

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KALAMAZOO 16, MICHIGAN

akimbo. "Mosquito Lake, my cock-eyed sister—what're we goin' to use for money?"

I could have started something by making the usual crack, but I held my tongue. "There's plenty to do around here, Lord knows—there's the kids—" She continued to ramble on and before I knew it I was out of the house and four blocks away looking through the doorway of a busy shop. As I stood there watching the fellow on the big lathe, I said to myself, "This looks better to me than Mosquito Lake, and I don't want to be pushed around for the next couple of weeks." Do you know, the first thing I knew I was talking to the foreman!

So you see, although I'm not as colorful on the outside as some of the guys when they return to the shop, I do glow with an internal peace brought on by the satisfaction of being partly stable, financially. The kids have all got new shoes and the old lady has a new hat. Mosquito Lake! Humph!

John Homewood
Ontario, Calif.

P.S. There's not a bit of truth to this story, but it has a moral. J. H.

•

Vacation—"an intermission of activity, employment or stated exercises as for recreation; a holiday"—is the definition supplied by Webster. Even with the addition of broader legal usage not shown, there is nothing to be construed from this meaning that "a change is as good as a rest."

What a man does with his own time is his own business—but is a paid vacation entirely a man's own?

Compulsion by law or no in the payment of these wages, they still represent a heavy expense item to the company involved. In a stabilized employment area with the majority of help permanent — two weeks' paid holiday represents half a month's payrool or 4% of the total annual amount for this commodity —not a sum to be poured down a drain by even the wealthiest of businesses. Therefore it may be safely said that management has a very definite interest in this "time" and that labor does have an obligation in the spending.

Sometimes even the best of us finds a pressing need for more money, and the time presenting itself earning during a paid vacation is the obvious help over the hump. However, because charity begins at home, the first duty is to one's self —to one's health and well-bing and to one's permanent employer. With these things uppermost, if work we must, when we should be playing,

Illustration of die milling by courtesy of the Bischof Die and Engraving Company of Racine, Wis.

BUT... GORTON *Tracer Controlled Milling* DID THE JOB

A Gorton Super-Speed Tracer-Controlled Milling Machine with adjustable ram together with a super-speed spindle made it possible to mill to a depth of 1/2" with a 1/16" dia. cutter (producing thin wall in finished die casting; see arrow). This was for the main frame for a vibrating hand massager manufactured by the John Oster Manufacturing Company of Racine, Wis. Only one Master model was used to mill a two-cavity die casting die with a minimum of hand finishing—this is typical of Gorton Tracer-Controlled equipment.

If you are interested in die and mold work, production profiling, super-speed milling, engraving, graduating, contour grinding or electric etching of hardened parts, let...

GORTON PRE-DETERMINE RESULTS FOR YOU

Mail us complete description with prints of your job. Gorton engineers will furnish you with a production estimate of it tooled on a Gorton—no obligation.

THE JOB IN BRIEF

- *Job:* Mill 2-cavity die casting die from single soft master.
- *Material:* Hot formed die steel.
- *Machine:* Gorton 8 1/2-D Super-Speed Duplicator.
- *Method:* Two machine settings per cavity without resetting work.
- *Cutters:* Gorton single flute; minimum dia., 1/16"; maximum depth of cut, 1/2".
- *Spindle Speeds:* Roughing, 250 r.p.m.; finishing, 6000 r.p.m.
- *Limits:* .002" with minimum hand finishing.

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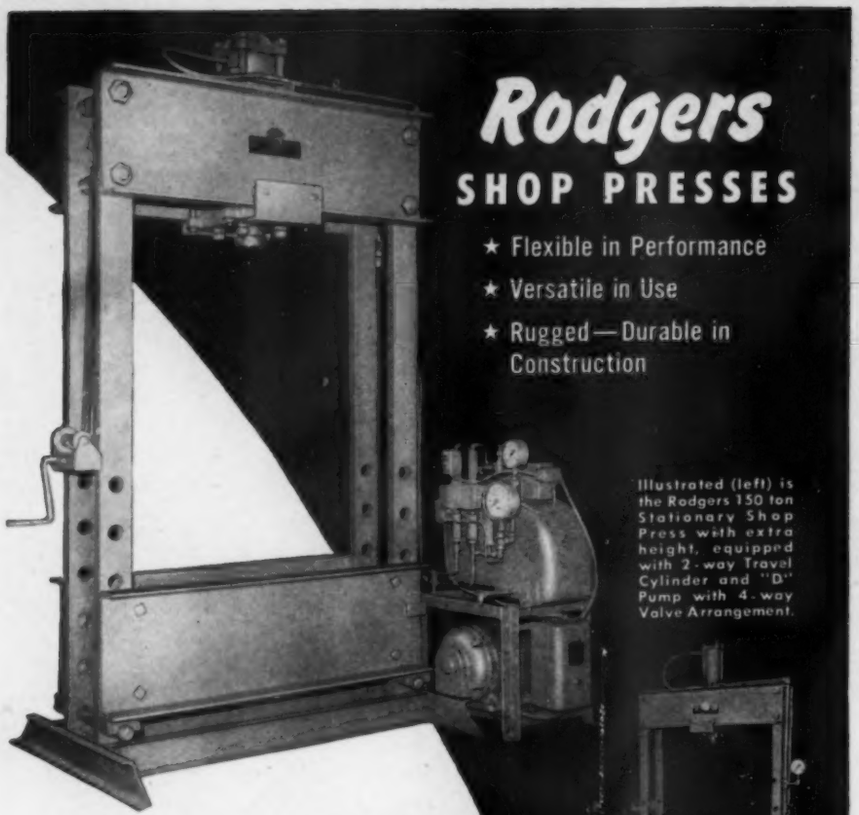

Rodgers
SHOP PRESSES

★ Flexible in Performance
★ Versatile in Use
★ Rugged—Durable in Construction

Illustrated (left) is the Rodgers 150 ton Stationary Shop Press with extra height, equipped with 2-way Travel Cylinder and "D" Pump with 4-way Valve Arrangement.

The Rodgers "Sixty"—60 ton Shop Press (shown above) takes care of those miscellaneous jobs that waste so much time and labor. Available with hand operated pumps, or with gear head motor drive, also powered with "D" pump power unit.

Rodgers 100-ton Stationary Shop Press powered with 4-Speed Hand Operated Hydraulic Pump, also available with "D" pump power unit. Please note that on all presses the cylinder is movable across the entire width of press.

For tough service and maintenance work in pressing, squeezing and forcing, there is a Rodgers Press to meet your requirements. These rugged, flexible shop presses are available in 60, 100, 150 and 200 ton sizes. (300 and 400 ton capacity presses are available upon special order). They all embody the same proved Rodgers design and performance features: Bolster of press is raised and lowered by a hand crank . . . special alloy steel pins can be adjusted to allow desired opening . . . cylinders may be had with one way travel or two way travel in ram travel lengths from 6" to 14" as desired—frame construction is of strong, durable rolled steel plate. Power is supplied by self-lubricating hand pumps or power driven pumps.

Save time and labor on your jobs with a Rodgers Shop Press—the exact model that is best suited for your needs. You'll get prompt delivery on any standard model press.

See Rodgers Presses at Machine Tool Show—Chicago, Sept. 17-26

✻ *Send for this catalog giving complete descriptions, illustrations and specifications of Rodgers Shop Presses. There's no obligation. Write today for your copy.*

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some change of venue should be sought. It does a clerk no good beyond monetary reward to leave his office job to clerk in a bank—a laborer none at all to dig in a different ditch—but for a city fellow to trade places with his country cousin is something else again. Little harm can be seen in a few honest hard-won dollars earned by the sweat of a machinist's brow at such tasks as two weeks pitching hay.

A. M. Elliott
Le Roy, N. Y.

•

Even if the employee doesn't get himself another job during the vacation period, he sometimes comes back just as tired as when he left. Of course, the change in environment has been good for him and he has probably relaxed to some extent.

Vacations are given employees in order that they may relax and renew their vigor for continued work. A man can do this in many ways. Some people can relax while doing other types of work; others must do nothing but loaf.

In the case of Thompson, he certainly should never have taken another job in his same field of work. What he actually did was to further tax his strength and run down his physical and mental condition by continued labor. Had he taken a job driving a truck, or something equally foreign to his daily work, he would have obtained the needed mental relaxation. At least it would have been a change.

I am afraid that I must agree with Al that while the individual is the actual loser, the company also loses heavily when an employee is irritable. It may be that such employees need to be educated in the ways of proper living. This education of employees, whether it is in the line of job application or of health, falls to the foreman.

Let us try to educate our men to take vacations and to get the necessary relaxation. Try to get across to the employee that it is for his own good health and for the future of his job that he should loaf if possible. If he must work, either because of a nervous temperament that does not permit him to sit still, or because of the need for the extra money, let him pick a job that is utterly foreign to his regular employment. The foreman must remember though that he can suggest but he cannot dictate what the employee does outside of the plant.

Charles D. Townsend
Centralia, Mo.

NEW Oakite lubricant for ball burnishing gives you these 4 important advantages . . .

Cushion-like **lubrication which prevents scratching metal-to-metal contact.**

Rich **suds in hard or soft water at economically low concentrations.**

Free-rinsing action **that suspends dirt in solution; prevents soapy film build-up on balls and work.**

Resistance **to acids carried over from rinse after bright dip.**

. . . at low cost!

WHEN you smooth out minute irregularities on your metals by ball burnishing, you need a durable lubricant that protects surfaces. Oakite Composition No. 3 provides that lubrication.

Oakite Composition No. 3 not only lubricates but gives required suds even in hard water areas. It is free of ingredients that might attack metal. Oakite Composition No. 3 also suspends dirt . . . keeps it from smudging the luster of burnished work. It leaves no unrinsable soapy film on work or balls. Helps you bring out clean luster on your metal surfaces—safely.

Use Oakite Composition No. 3 for better, safe burnishing of steel, brass and aluminum parts. Use it to clean and condition balls and shapes. Use it as a medium for storage of balls and shapes.

Free Service Report gives full details on the use of Oakite Composition No. 3 for ball burnishing. Also shows methods for cleaning steel, brass and aluminum *before* burnishing. Just send request on your letterhead.

Practical Advisory Service: Your Oakite Technical Service Representative will gladly help you set up pre-cleaning procedures and work out proper concentrations for burnishing solutions. Check with him for data on all your cleaning and surface preparation jobs. No obligation.

OAKITE PRODUCTS, INC.
24 Thames Street, NEW YORK 6, N. Y.
Technical Service Representatives Located in Principal Cities of United States and Canada

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MATERIALS
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Specialized Industrial Cleaning

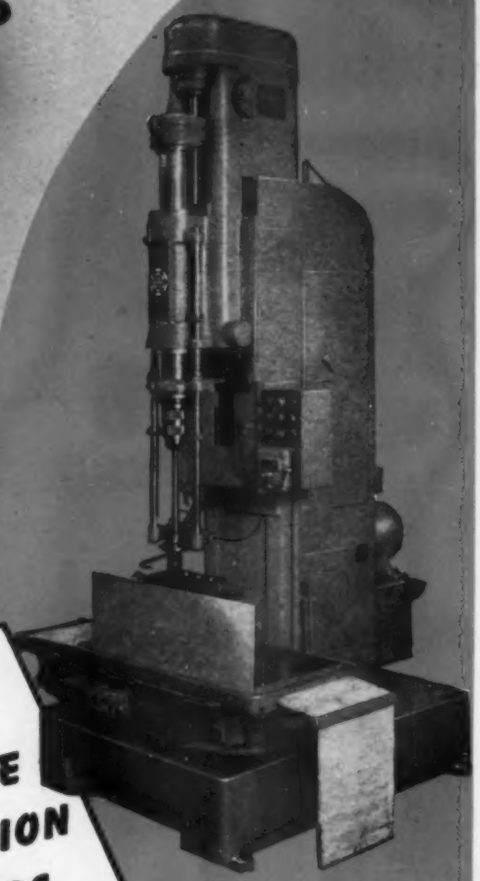
MICROHONING is
BETTER QUALITY . . .
GREATER OUTPUT
PLUS

High Precision Accuracy

Automatic High Precision Sizing

Fast, Heavy Stock Removal

High Precision Surface Finish



MODEL 728

MICROMATIC OFFERS NEW QUILL-TYPE HIGH PRODUCTION HYDROHONERS

Completely automatic, electronic control of uniform size within tolerance of 0.0001 to 0.0003-inch is a production-proven feature of these new unit-assembled, hydraulically actuated, heavy-duty Hydrohoners.

With this simplified, spindle-in-quill construction torque and thrust is restricted to the centerline of the spindle—alignment is accurately maintained—weight of parts in motion is minimized—stroking speeds may be higher without increasing power input—all conventional mechanical linkages and hydraulic systems are simplified.

To explore the amazing, new possibilities of the Quicker, Better, Lower Cost Method of Production Processing by Microhoning.

WRITE NOW for further specifications.

MICROMATIC HONE CORPORATION Los Angeles, Cal. · Houston, Texas · Rockford, Ill.
8100 Schoolcraft Ave., Detroit 4, Michigan, U.S.A. Guilford, Conn. · Brantford, Ont., Can

To get the most out of a vacation, the needed rest is generally required. However, in some cases a change is more helpful than actual rest, particularly when a man is working at something other than what he has the greatest liking for.

In some cases the man is confined so closely at his regular work that he hasn't time to indulge in any form of recreation. If he can during his vacation fish or hunt or participate in some other form of active recreation, although tired, he will feel better satisfied for having the needed change.

I can see no injustice done to anyone if during his vacation time a man engages in work in a place where he can expect to gain desired knowledge.

Each individual case needs to be decided on its own merits, as there are distinctly two classes to deal with: One is satisfied with repetition work, while the other prefers something new every day, or at least as frequently as circumstances will allow.

Abel Blakeman
Watervliet, N. Y.

•

FRIEND OR FOREMAN?

Perhaps one of the most important tasks confronting foremen is the job of maintaining sound morale within their departments. This means that those things which tend to promote petty jealousies and friction among men must be avoided. It appears difficult to see how such things can be avoided if a foreman undertakes to go along on pleasure jaunts with individuals who report directly to him. This is especially true when it pertains to the average or large-sized organizations.

As harmless as such pleasure trips might be, the employee or employees who are involved become "watched" men, particularly with respect to job assignments. It is fine policy for foremen to build and maintain amicable relationships with the men. However, from observation and experience, the intelligent way to do this is to attend occasional group gatherings, such as picnics or other social events, when a good part of the department is in attendance.

The foreman's job today is a difficult one. Therefore there is no logic in doing things which might make the job more difficult. If a foreman likes his fishing, it is better to enjoy this pastime when arranged on a group basis.

Peter L. Budwitz
New Britain, Conn.

"TOPS"

in the Rotary File Field

THEY'RE "TOPS" in every respect . . . quality . . . performance . . . long service. That's why Nicholson Rotary Files and Burs are largely preferred by experienced industrial craftsmen. For throughout their wide range of types, cuts and sizes, Nicholson Rotaries are manufactured to high precision standards — perfectly rounded, true centered, accurately cut or ground, expertly hardened.

For delicate filing operations, Nicholson now offers Rotary Files (hand cut) and Burs (ground from solid) with 1/8" shanks. Available in 9 standard shapes, one degree of coarseness, with stock diameters from 1/8" to 5/8".

For general-purpose filing, there are 1/4" shank Nicholson Hand Cut Rotary Files and Ground Burs. 16 standard shapes. 3 cuts — Coarse, Medium, Fine. 1/8" to 1 1/8" stock diameters.

For long production runs, there are Nicholson Cemented Carbide Burs — with wearing qualities up to a hundred times that of high-speed tool steel. 1/4" shanks. 9 standard shapes. 1/4" to 1" stock diameters.

Write for further information. Also consult your industrial distributor. He will fill your needs and render helpful assistance on selections.

NICHOLSON FILE CO. • 97 ACORN ST., PROVIDENCE 1, R. I.
(In Canada, Port Hope, Ont.)

NICHOLSON ROTARY FILES
HAND CUT OR GROUND — FOR EVERY PURPOSE

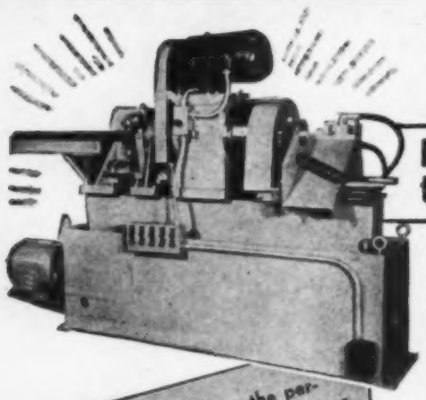
NICHOLSON U.S.A.

575 TUBES CUT-OFF Per Hour

Pines Machine Cuts to .004" Tolerance in Length

A prominent manufacturer of automotive parts uses the Pines Cut-Off Machine to cut 575 pieces of 2¼" x .065 steel wall tubing per hour. Previous production for the same operation on other equipment produced only 70 pieces per hour. In addition, the Pines Cut-Off Machine assures greater accuracy length to .004" tolerance and permits the operator to handle other work.

The operator simply initiates continuous operation by starting a long piece of tubing through the motor driven feed rolls. The finished parts are discharged into a container as the tube is automatically cut-off to the desired length.



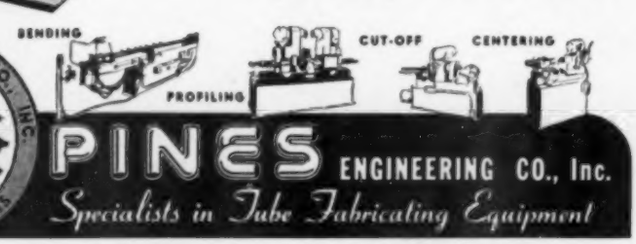
Fast-Acting, Simple Operation Reduces Cost per Piece

The Pines Cut-Off Machine is the **simple automatic** way to cut pipe or tubing to accurate lengths rapidly. The machine only requires the operator to set the tools and supply it with stock.

The average time to complete a machining cycle is 1½ seconds. Pines Cut-Off Machines can produce 1500 pieces per hour depending on material, diameter, wall thickness, length and type cut desired. Adjustable stop target determines cut-off length and may be quickly set to suit job requirements.

Pines Engineering Service can assist you on your tubing and pipe cut-off problems. There is no obligation for this assistance.

Today . . . write for the performance advantages of Pines Cut-Off Machines. Your free copy of the NEW Pines Catalog No. 101C will be sent when requested on company letterhead.



PINES ENGINEERING CO., Inc.

Specialists in Tube Fabricating Equipment

BENDING PROFILING CUT-OFF CENTERING MACHINES — PINES ENGINEERING CO., INC. — AURORA, ILLINOIS

675 WALNUT AURORA, ILLINOIS

NEW BOOKS

FLUORESCENT LIGHTING MANUAL—*Second Edition. By Charles L. Amick, Lamp Dept., General Electric Co., Nela Park Eng. Div. 318 pages. Published by The McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. Price $4.*

Fundamental principles of fluorescent lighting are presented in this manual in such a way that the layman and the lighting engineer will draw much valuable information.

Explanations of the cold-cathode lamp, Circuline and Thinline tubes are completely covered as well as the standard hot-cathode lamps.

Operating characteristics, auxiliary equipment, installation hints and service suggestions, treated as individual subjects, will prove invaluable to the maintenance man.

The design engineer will find useful chapters on luminaire selection, lighting design, color quality, application and lighting economics.

Also covered are basic suggestions for eliminating radio interference which for sometime has proved annoying in the installation of fluorescent lamps in the home and other living quarters.

•

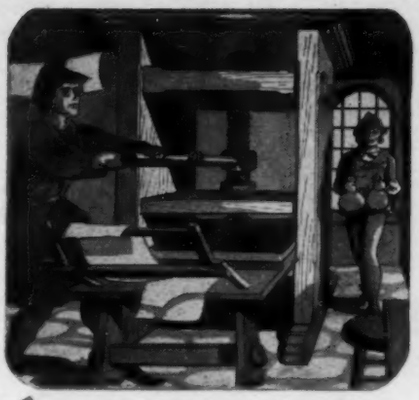
FATIGUE AND IMPAIRMENT IN MAN—*By Dr. S. Howard Bartley and Eloise Chute. Published by the McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. 429 pages, 6 x 9 in. Price $5.50.*

This is primarily an effort to assemble and integrate the findings from research in the last quarter century. It is a scholarly treatise, dealing in particular with the confusion existing in the understanding of fatigue. The authors conclude, among other things, that fatigue is not an energy affair, but rather a result of mental conflict which can be induced even by contemplation of a disagreeable task. Further, it may not be alleviated by rest or sleep unless the conflicts that caused it are first mitigated.

•

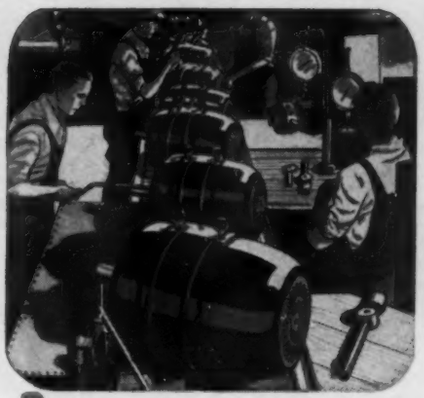
FINANCIAL MANAGEMENT SERIES BULLETINS—*Published by the American Management Association, 330 West 42nd St., New York 18, N. Y., from papers presented at financial management conferences.*

Bulletin No. 83 (32 pages—$0.50)—Overhauling Pension and Profit-



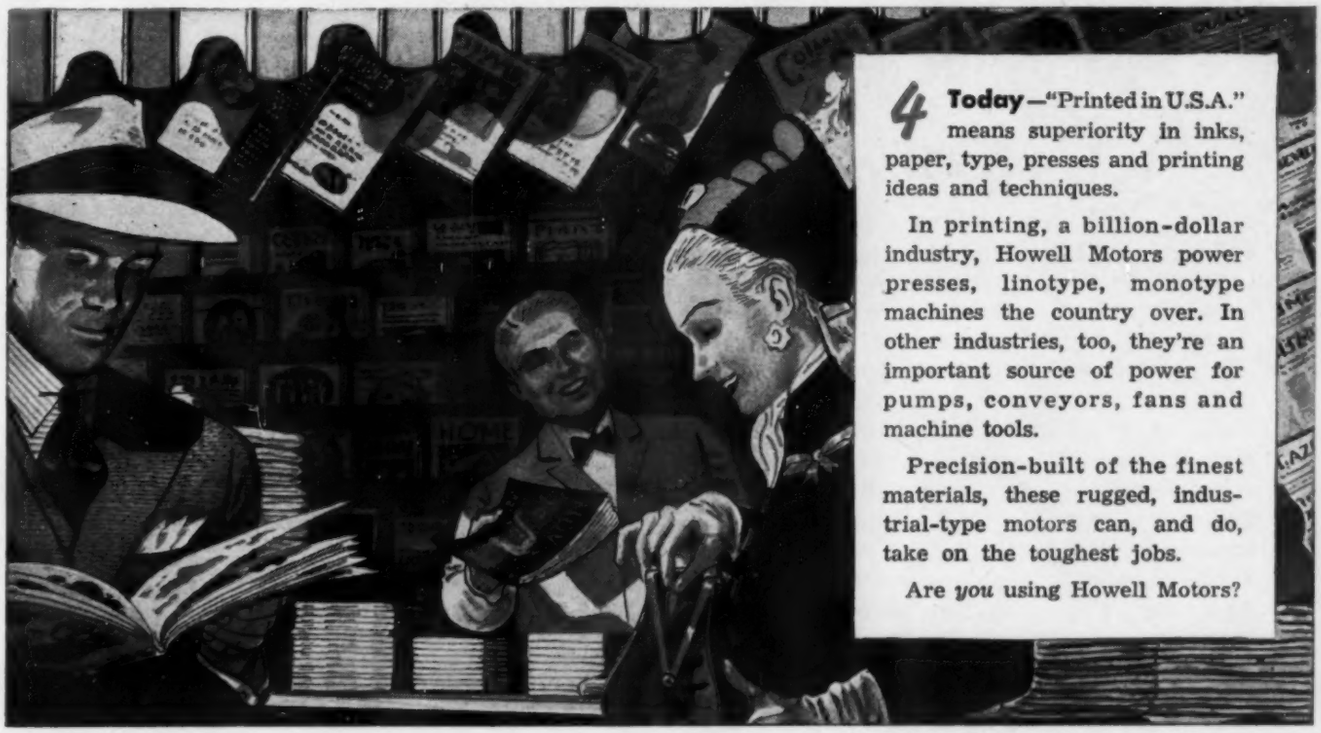
1 **1450**—First printing presses stemmed from cheese or cider presses. Gutenberg's hand press used type carved from wood and metal. Four centuries later printing was still largely a manual operation. But the Industrial Revolution was near.

2 **1875-95**—Electric power revolutionized printing. Hand work gave way to powered presses and machines. Foot treadles and hand cranks disappeared. Low cost electricity started printing on its way to becoming a modern art.



3 **1930**—Whereas, Gutenberg was 7 years printing 200 copies of his Bible —presses of the thirties did the job in 20 minutes! In 1915 Howell "Red Band" motors were introduced. They won instant acclaim in this and other industries.

"Printed in U. S. A."—and how!



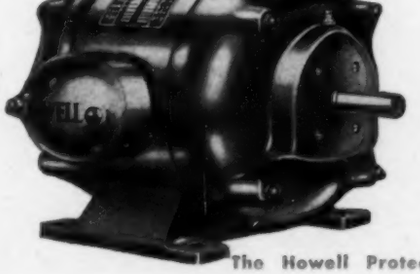
4 **Today**—"Printed in U.S.A." means superiority in inks, paper, type, presses and printing ideas and techniques.

In printing, a billion-dollar industry, Howell Motors power presses, linotype, monotype machines the country over. In other industries, too, they're an important source of power for pumps, conveyors, fans and machine tools.

Precision-built of the finest materials, these rugged, industrial-type motors can, and do, take on the toughest jobs.

Are *you* using Howell Motors?

Here's another precision-built Howell Motor . . . industrial type with copper or bronze rotors . . . specially insulated . . . statically and dynamically balanced.

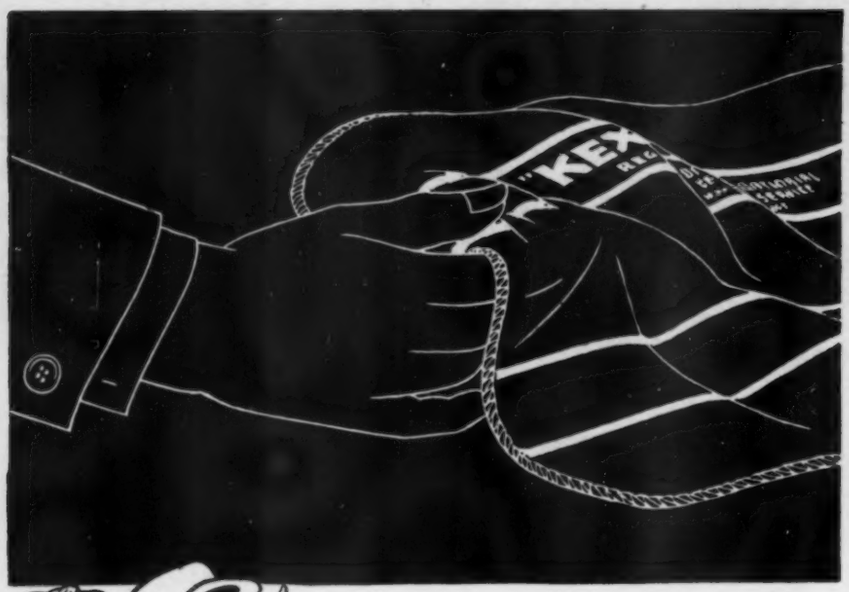


The Howell Protected Type Motors

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915



Any way you look at it

"KEX" INDUSTRIAL WIPING TOWELS are SAFE!

Safety—KEX Wiping Towels have no uneven, ragged edging that can catch onto and damage machinery, or cause accidents. They are unlike cast-offs that have served other purposes or their usefulness. A KEX towel is compact and adapts itself to the hand. Their smooth textured surfaces and finishes are important safety factors.

Hygiene—KEX Wiping Towels are thoroughly clean—made that way by a special high heat process, delivered fresh, on regular schedules, and in required amounts.

Economy—KEX Wiping Towels are rented. Nothing to buy. No expensive inventory. Just a low monthly rental. The first month should show you an appreciable saving on wiping costs.

Softness—You can use KEX Wiping Towels on the most delicate polished surface. There isn't a hard seam, button or bit of hidden abrasive to scratch or mar.

Usable Space—Big, tough and uniform in size, KEX Wiping Towels can be used right to their very edges.

For complete information, see classified section of your Telephone Directory for nearest KEX distributor, or write
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"KEX" REG. U. S. PAT. OFF. NATIONAL SERVICE A CALLAWAY MILLS PRODUCT INDUSTRIAL WIPING CLOTHS

Sharing Plans by Meyer M. Goldstein, Director, Pension Planning Co. of New York. This is an intelligent and fairly complete study of the necessity for, and organization of, both pension and profit-sharing plans.

Bulletin No. 85 (26 pages—$0.50)—A panel discussion on Departmental Cooperation in Cost Reduction: introduction by Wyman P. Fiske, insurance by Herbert L. Jamison, sales by W. E. Jones, customer service by J. O. Eastlack, production by Alfred L. Smith and office by William H. Evans.

Bulletin No. 88 (43 pages—$1.00)—Productivity, Profits and Labor by John L. Carey, The Public Interest and the Corporate Annual Report by W. Homer Turner, Reporting to Employees by W. H. Franklin and The Stockholders and the Annual Report by Gaston Marque.

•

AIR CONDITIONING—*By Herbert and Harold Herkimer. Published by the Chemical Publishing Co., Inc., Brooklyn, N. Y. 692 pages, 5½ x 8¾ in. Price $12.*

This is essentially a book for the air-conditioning engineer, beginning with the fundamental laws involved (the first quarter of the book) and including design, estimation, sales, installation and servicing. For the average engineer or student it presents a thorough course in air conditioning—somewhat more than the usual shop executive will require.

It is interesting to note that the list of possible applications, credited to the American Society of Heating & Ventilating Engineers, includes no references to metalworking applications, hence is somewhat out of date. This opinion is substantiated by the fact that the automotive portion of the list includes processing of wooden spokes. No mention is made of process applications such as in gage making or close-tolerance assembly, nor of comfort conditioning of drafting rooms, forge shops, and other departments where heat, humidity or vapors present problems.

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INDUSTRIAL APPRENTICESHIP—*By Paul Bergevin. Published by McGraw-Hill Book Company, 330 West 42nd St., New York 18, N. Y. 280 pages. Price, $2.75.*

With industry's return to postwar normalcy, accelerated training pro-

3 New Motch & Merryweather Bulletins

MOTCH & MERRYWEATHER
PLACES BEFORE YOU AN
Unparalleled Experience
IN THE CIRCULAR SAWING of METALS
IN THE FORM of SAWING MACHINES, SAW BLADES and BLADE SHARPENERS
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Ask for this new 16-page bulletin on the entire line of Motch & Merryweather Circular Sawing Equipment.

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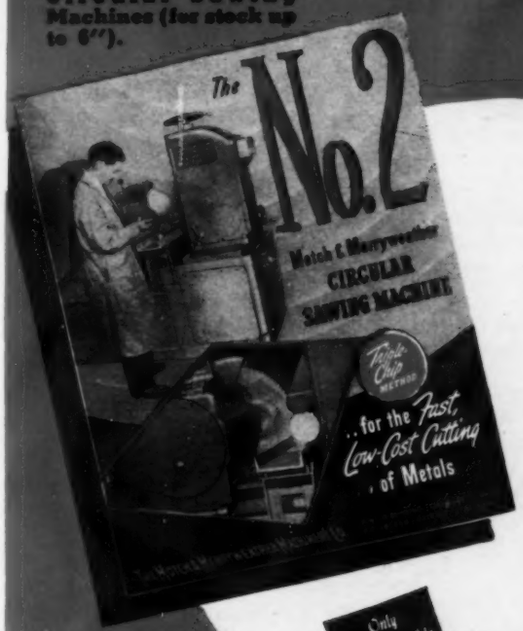
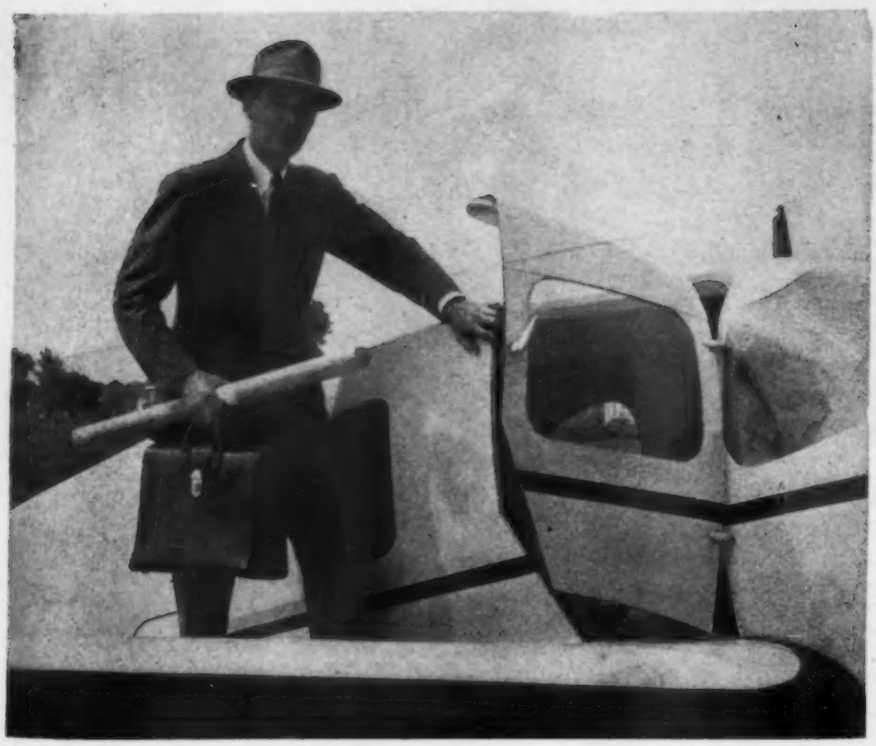


Here are three new bulletins for your circular sawing "library". In them you will find valuable information stemming from an unparalleled experience in this field. Only Motch & Merryweather offers you this background — derived from many years spent in building "all 3": the Triple-Chip Saw Blade, the circular sawing machine that uses it, and the blade sharpener that gives it the proper tooth contour. Get details now about the Triple-Chip Method, which has a remarkable knack for bringing cut-off costs away, 'way down.

Only M. & M. builds ALL 3: CIRCULAR SAW · SAW BLADE · BLADE GRINDER

THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING CLEVELAND 13, OHIO

AT YOUR COMMAND · AN UNPARALLELED EXPERIENCE IN CIRCULAR SAWING



Manufacturer Flies Ryerson Engineer to Plant...

and returns him with problem solved

A machinery manufacturer faced an emergency. He was changing over to flame-cut steel plate for many parts previously cast. In the process of changeover, unforeseen production problems threatened to stall his entire operation. Committed to a heavy schedule of deliveries he saw the threat of reduced volume as an inconvenience to customers—a mark against his company.

Moving swiftly against time, he called Ryerson in a neighboring state offering to send his company plane if a Ryerson specialist would make a flying trip to his plant. We agreed, and, in a matter of hours, a Ryerson engineer was on the spot giving practical assistance.

By simplifying several parts, engineering difficulties were avoided. Standardization of other parts reduced cost and made better use of available steel. There was no slow-down in production.

As our specialist was flown back that same day, he made out a report covering his activities. It was brief enough. It read: Customer service.

That brief report—customer service—sums up the reason so many steel users make Ryerson the first source for steel from stock and turn to us in time of trouble. Despite steel shortages there is no shortage in our willingness and ability to cooperate. Our technical men will gladly work with you on any steel problem, or assist in the search for a suitable alternate when needed steel is not available.

Remember that Ryerson facilities and experience are always at your service when you call.

JOSEPH T. RYERSON & SON, INC., Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles

RYERSON STEEL

grams, made necessary during war production, have been set aside. The importance of apprentice training cannot be over-emphasized. It is the basic foundation for the nation's future craftsmen.

The author of Industrial Apprenticeship has made an exhaustive study of apprentice programs in various industrial plants. He has culled the efficient aspects of various programs into a sound basic presentation of fundamental principles and best practices for apprentice programs.

The book is an over-all treatment and discusses principles, planning, administration, shop and related instruction, apprentice selection and organization and evaluation. Much of the training procedures are directed at apprentices for machinist and tool and die maker trades. Metalworking plants operating apprentice programs, and those contemplating such training plans will find this book helpful. A comprehensive bibliography is appended.

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PERSONNEL SERIES BULLETINS—*Published by the American Management Association, 330 West 42nd St., New York 18, N. Y., from papers presented at personnel conferences during 1946 and 1947.*

Bulletin 102 (42 pages—$1.00)—Does Management Get Its Message Across to Employees by Martin Dodge, Time Out for Briefing—I by James Farmer, Time Out for Briefing—II by Roderic Olzendam and The Status of Personnel Administration in Management by Guy B. Arthur, Jr.

Bulletin 103 (46 pages—$1.00)—Wages and Productivity—the Problems Involved by F. D. Newbury, A Plan to Share Cost Savings with Employees by David W. Rust and Pattern of Tomorrow's Collective Bargaining—panel discussion.

Bulletin 104 (32 pages—$0.75)—A Company Program for Executive Developement by John R. Bangs and L. F. Randall, Re-evaluation of Training for Management Skills by Douglas McGregor and Reemployment and Inservice Training for Veterans by Norman Randolph.

Bulletin 105 (22 pages—$0.50)—Maintaining Regularized Employment by Matthew Radom and The Annual Wage Concept and Management Planning by Joseph L. Snider.

Bulletin 106 (30 pages—$0.50)—

when floor-to-floor time is measured in hours or days

make the part from *SPEED CASE* or *SPEED TREAT* Time Saver Steel

Holliday *Speed Case* and *Speed Treat* Steel Plates offer four big advantages . . . whenever parts must be machined from solid metal or large built up sections.

1. TIME SAVING—in job after job *Speed Case* and *Speed Treat* have consistently provided savings in machining time of from 25% to 40%.
2. FINE FINISH—the tooled surfaces of these steels are of such superior quality that in many instances grinding or polishing is unnecessary.
3. LONG TOOL LIFE—uniform microstructure keeps tool wear at a minimum . . . protects tools against breakage.
4. ECONOMY IN HEAT TREATING — faster carburizing properties of *Speed Case* decrease cost. Dependable response of *Speed Treat* to induction or flame hardening lowers cost and lessens hazards of conventional heat treatment.

For all the facts on Holliday *Speed Case* and *Speed Treat*, ask for your nearest representative to call.

W. J. HOLLIDAY & CO., INC.

Speed Case–Speed Treat Plate Division

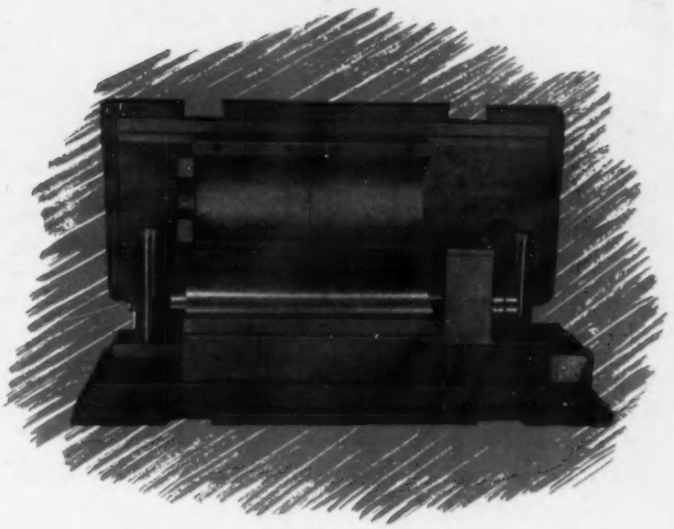
HAMMOND INDIANA

Plants: Hammond and Indianapolis, Indiana

SPEED CASE
LOW CARBON
AND
SPEED TREAT
MEDIUM CARBON OPEN HEARTH FREE MACHINING
STEEL
PLATES

91 1856 YEARS OF STEEL 1947

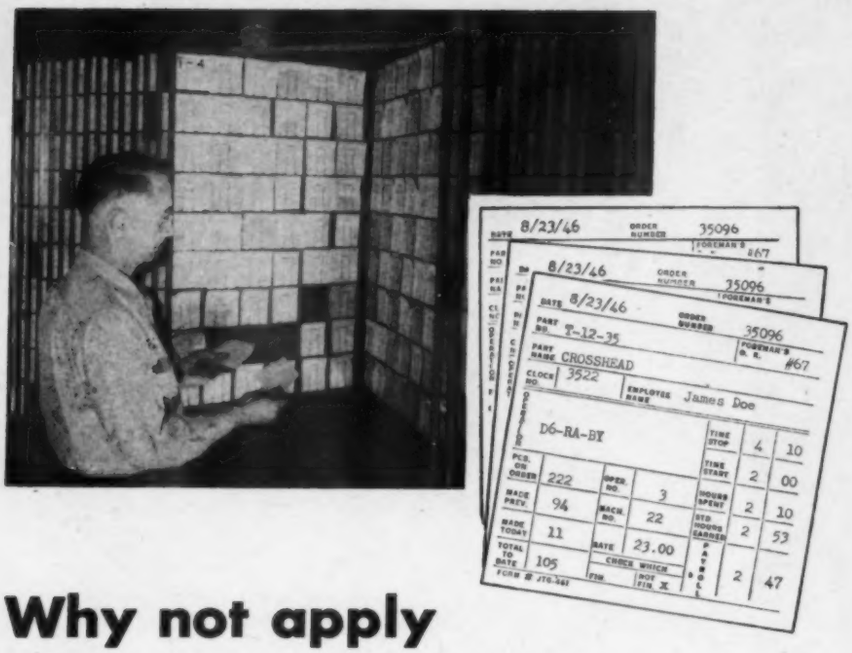
DRIVE GEAR for billet shear . . . made from *Speed Treat* plate. The web was flame cut from 1¾" plate and welded to the 53" diameter ring, flame cut from 7" plate. Fabricated gear blank and machined gear with flame hardened teeth are shown above.



PUNCH and DIE for forming 8" diameter Furnace Pipe. Use of *Speed Case* and *Speed Treat* steel in making this die-set resulted in an estimated overall cost saving of 23%. The die-set was designed and produced by the Beach Specialty Company, St. Clair Shores, Michigan.

Available in all common plate sizes from these distributors:

AKRON 1, Ohio
The Burger Iron Company
BUFFALO 5, New York
Beals, McCarthy and Rogers
BOSTON 10, Massachusetts
Brown-Wales Company
DETROIT 7, Michigan
Peninsular Steel Co.
HOUSTON 1, Texas
Earle M. Jorgensen Co.
LOS ANGELES 54, California
Earle M. Jorgensen Co.
MEMPHIS 2, Tennessee
Pidgeon-Thomas Iron Co.
NEWARK 5, New Jersey
Grammer, Dempsey & Hudson
OAKLAND 7, California
Earle M. Jorgensen Co.
PHILADELPHIA 34, Penna.
Horace T. Potts Co.
CANADA: Toronto 2, Ontario, Peckover's, Ltd.



Why not apply Work Simplification to your Control Systems, too?

Compare the use of McCaskey multiple copy forms and "visible-filing" for Production Control, Payroll and Cost records with the usual posted procedures. The difference in essential operations shown by a simple process chart is most revealing. McCaskey eliminates numerous handling and posting operations. The advantages of visible records, immediately available, also add savings in both handling and time.

Barrett-Cravens Company, Chicago, made such a comparison in 1943 and adopted McCaskey for individual controls of special production orders and stock parts. A few of the important facts they secure, for example, with *only one writing* of their McCaskey triplicate time tickets are:

(1) Status of every production order, special or stock, visualized within minutes after the completion of an operation;

(2) Operation cost data immediately available for analysis and investigation of variations;

(3) Accurate, up-to-the-minute data reduce dependence on stock chasers;

(4) Incentive pay-roll records checked and quantity count verified;

(5) Verified record of production for operators on incentive work, preventing disputes and dissatisfaction.

Write for a demonstration and suggestions for an application to your particular needs—or send for a copy of "The ABC's of Production Control" and other descriptive folders.

McCaskey INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Canada The McCaskey Register Co., Watford, England

American Business and Its Human Relations by Fowler McCormick, Industrial Relations and Social Change by Benjamin L. Masse and Changing Concepts in Collective Bargaining by E. H. van Delden.

Bulletin 107 (50 pages—$1.00)—Evaluation of Managerial Positions by B. B. Warren, Seniority and Merit Rating in Labor Relations by Guy W. Wadsworth, Jr. and Psychology Challenges Industry by David W. Cook.

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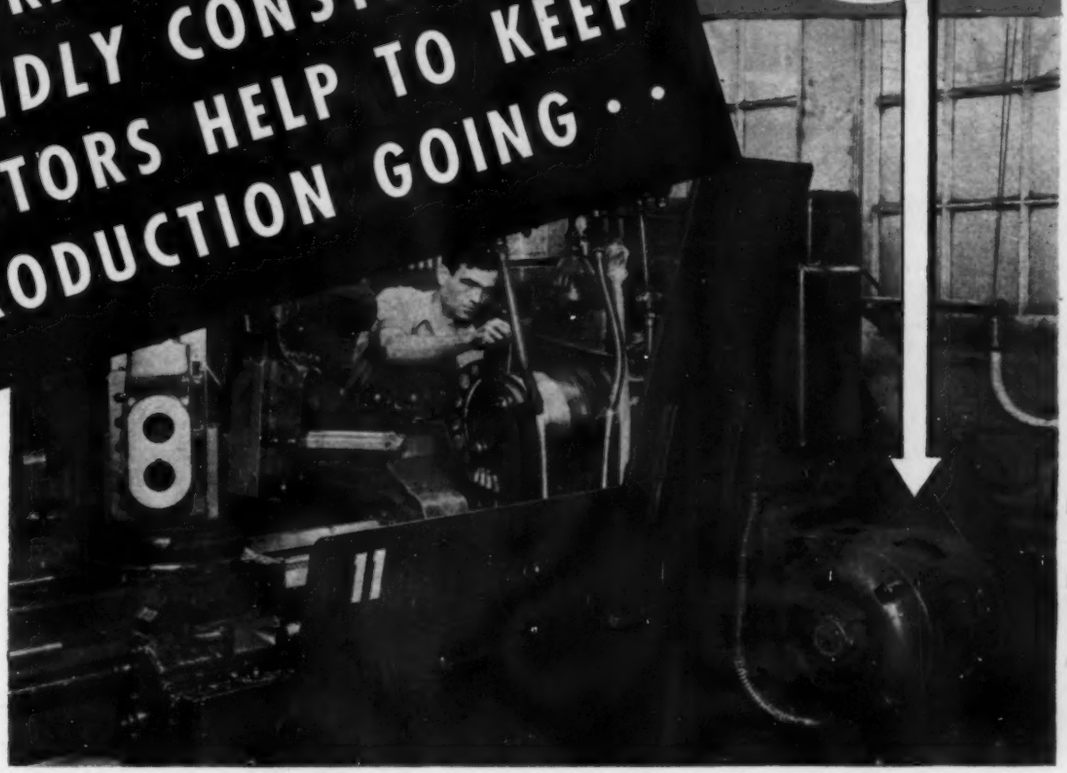
TO THE EDITOR

GUARANTEED WEAKNESS?

The advocates of the Guaranteed Wage, as do many big-hearted social reformers, appear to let their solicitude for the workers' welfare obscure their vision inasmuch as they fail entirely to take into account elemental human nature.

One of the supposed advantages of the Guaranteed Wage is security for workers, with greater productiv-

WHEN PARTS MUST BE ACCURATE—CENTURY RIGIDLY CONSTRUCTED MOTORS HELP TO KEEP PRODUCTION GOING . .

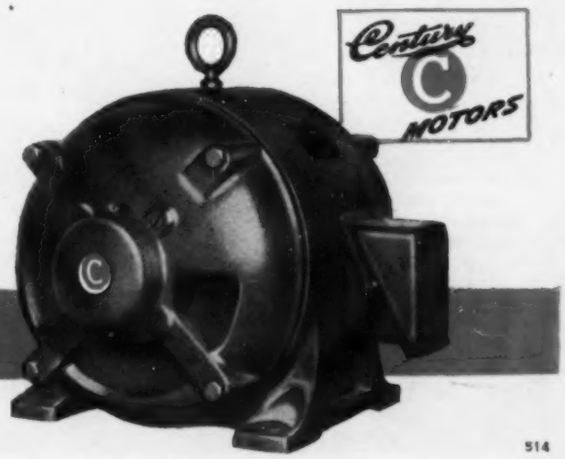


25 horsepower Century Squirrel Cage motor operates a turret lathe producing accurate machine parts.

Century motors produce the smooth power needed for highest precision work — they are built with accurate mechanical and electrical balance, permanent alignment, accurately machined mounting feet. And, all parts are housed in a rugged frame that holds all parts rigidly in place, so that top performance is assured throughout a long motor life — even under the toughest operating conditions.

Century builds a complete line of electric motors and generators, fractional and integral horsepower, in the popular sizes to meet the requirements of industrial production, processing, commercial and home needs.

Specify Century motors for all your electric motor power requirements.

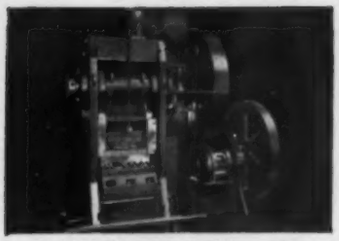


CENTURY ELECTRIC COMPANY

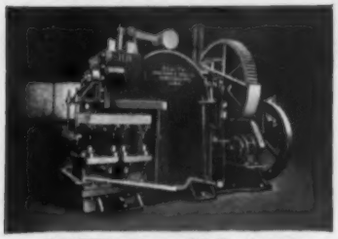
1806 Pine Street • St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

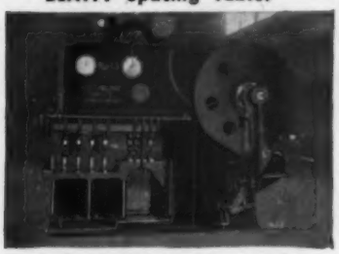
514



BEATTY Guillotine Bar Shear in capacities up to 300 ton.



BEATTY No. 11-B heavy duty punch for production tooling and use with BEATTY Spacing Table.



BEATTY No. 14 Toggle Beam Punch for structural steel fabrication.

BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging, bending.

BEATTY 250-ton gap type press for forming, bending, flanging, pressing.

WHEN SEARCHING FOR PRODUCTION IMPROVEMENTS
STANDARD
TODAYS SPECIAL !
MACHINES
DON'T LET THE LIMITATIONS OF STANDARD MACHINES LIMIT YOUR THINKING !
BRING US YOUR PROBLEMS AND IDEAS ---
AND LET US BUILD A MACHINE AROUND THEM. THATS THE WAY TO GAIN A TRUE COMPETITIVE PRODUCTION ADVANTAGE
THERE'S A BETTER WAY TO DO IT !

HYDRAULIC PLATE METAL WORKING EQUIPMENT

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

ity per man as the fear of losing his job fades out. That is the theory, a very pleasing one; actually the reverse is the case. The instant an individual knows that his future is secure, he begins to lose the one incentive that keeps him on his toes, *viz.*, the need to work hard in order to hold his job.

I make not the slightest suggestion that the easing off in effort is deliberate; it is just little old human nature unconsciously asserting itself. Workers would indignantly deny any suggestion of slacking. Neither is this trait peculiar to one country or people; it is common to all mankind in greater or lesser degree.

To see the full results of security, one has only to look at state-controlled establishments such as the Civil Service, Post Office, etc., (I am speaking of Great Britain) where, except for serious misbehavior, employees have a safe job for their working life, with a pension to follow. How long would an ordinary industrial concern last if the same spirit of "mañana" prevailed amongst the workers? Even more convincing proof of the enervating effect that security produces is given by conditions prevailing in Britain at this moment.

Shortage of labor is very acute, so much so that workers know they will only be dismissed under exceptional circumstances. Despite this shortage, several industries have succeeded in gaining a 5-day week, *plus substantial wage increases.* And what is the result? Output per man-hour has fallen so seriously that the stability of the country is endangered and, despite urgent appeals by the Prime Minister, Cabinet Ministers and Trade Union Leaders for greater efforts by the workers, the only response is a series of unofficial strikes, occurring almost daily, over the most trivial of imaginary injustices.

Brutal as it may sound, history through the ages has proven that the only thing that induces a man to stick at his work is the fear of "getting the sack"—or in English, losing his job.

C. Lewis
Luton, England

•

A TRIBUTE TO FRED H. COLVIN

To the writer, it seems that the proper time to speak well of what a man has done for his fellow men is while the benefactor may know how others feel toward him; also, before one forgets the good intentions.

We, therefore, extend to Fred H.

640 BACK SPOTFACING OPERATIONS PER HOUR AT 80% EFFICIENCY .....

make this Baush 2-Way "Vee" Type Multi-Spindle Back Spotfacing Machine a profitable unit to have in any plant producing V-Type Automotive Cylinder Blocks.

A single operator can back spotface all 16 valve spring seats in a V-8 block at the rate of approximately 40 blocks per hour. Economy of man power and production such as this means PROFITS.

A Baush Engineer will be glad to show you how Baush equipment can speed production and help you meet today's competition. Write, phone or wire us today.

OPERATIONS:

Back spotface 16 valve spring seats in V-8 cylinder block — using (3) three revolutions of eccentric bars.

SPECIFICATIONS:

Baush 2-Way "Vee" Type (16) Spindle Back Spotfacing Machine. Two Special Units — each mounted on eccentric bars and hydraulic slides, accurately counterbalanced.

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

Leading builders of machine tools will tell you*...

HOFFMAN FILTRATION EQUIPMENT

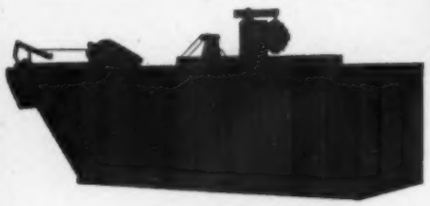
HELPS PRECISION WORK

LENGTHENS TOOL LIFE

PAYS ITS WAY IN MAINTENANCE SAVINGS

Take a tip from the makers of America's finest machine tools. They recommend Hoffman filtration equipment as a standard accessory for better production. Hoffman units are engineered to deliver clean coolant at specified flow rates. They help to enhance precision finish . . . permit machines to operate longer without cleaning or replacement of cutting or grinding surfaces. Volume and quality of production are profitably improved. Write for Bulletin A-605 and a *free* engineering survey.

PRESSURE FILTERS



FLOTATION EQUIPMENT

VACUUM FILTERS

U. S. HOFFMAN MACHINERY CORPORATION
211 Lamson St., Syracuse, N.Y.
COOLANT FILTERS • FILTRATION ENGINEERING SERVICE

Colvin our most hearty congratulations on the completion of his latest book, *60 Years with Men and Machines*. Knowing that the thought is only one among the countless thousands who wish well to Mr. Colvin. His readers are fortunate in being able to secure a record of his findings during his long and active career.

What a record! Here we have a man who first knew machine shops in the early eighties of the last century. Days when motor drives, high-speed steel, carbides, portable electric or pneumatic power tools, electric lights, cutting torches, autogenous welding, safety devices, and endless lists of things, accepted today as a matter of course, were unknown. Instead, many mechanics of that day operated small lathes with hand-turning tools and cut threads with hand chasers. Shops had pit lathes for flywheels and large-swing jobs. A candle stuck into a nut was the common form of portable light, although a kerosene torch made more light—and more smoke. From those days of long ago until the present, Mr. Colvin has been abreast of mechanical progress.

The writer, starting as a machinist apprentice in 1892, and a reader of *American Machinist* since that time, has read countless articles by Mr. Colvin and, when working as a machinist, kept a copy of Colvin's *Machine Shop Arithmetic* in the tool box. It is only fitting to add that I feel that far more information, used later in life, was gained from reading the works of Colvin, and others of the period, than from any other source.

Very best wishes to Fred H. Colvin.

F. M. A'Hearn
Greenville, Pa.

•

WORK SANDWICHED IN

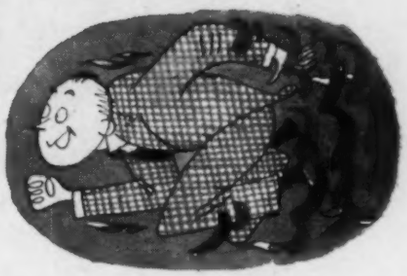
In the very early days of World War I, I first came in contact with executive difficulties. We were tooling up for high explosives, with shortages in materials, equipment, tools and whatnot—not to mention a word about red-tape. This was far out on the bleak prairies of Alberta—where our real shortage was good men.

Carpenters? Plenty. Pitchfork wielders? Oodles. Hayseeds? They were as plentiful as wild ducks in the fall. But men who could help me out were not to be had. I needed another toolmaker badly. The next afternoon I noticed a kindly disposed, diminutive individual stand-

Sid was sick of shortages—so...

1. . . . he finally decided to convert to aluminum.

2. His competitor, Carl, just laughed. "Aluminum can't be adapted to Sid's product," Carl chortled.

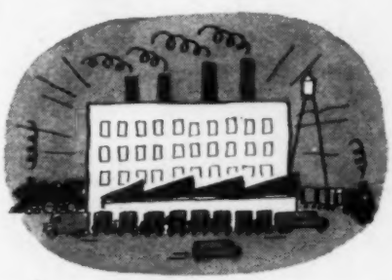


3. But Sid was off like a fireball! For he'd learned that alloys of Kaiser Aluminum could meet almost every type of operation. And it could be formed, drawn, spun, brazed or joined.

4. "So alright, he did it," shrugged Carl, "but the cost will break him."

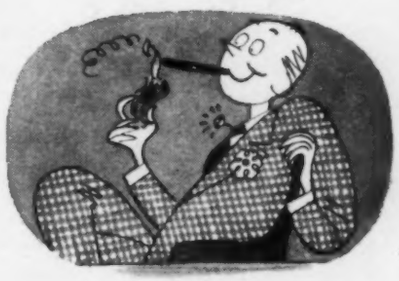
5. But foxy Sid found that though aluminum costs a little more to begin with, savings in handling, fabricating, finishing and shipping more than made up the difference.

6. Still, die-hard Carl wouldn't budge. No siree, he'd wait for the metal he had *always* used.



7. Meanwhile, Sid's product sold like popcorn at a circus. Folks preferred aluminum products. Result: Soaring production cut costs still further.

8. Now, would you rather be Carl?



9. . . . or Sid?

MORAL: Alert manufacturers—making everything from general appliances to residential buildings, from garage doors to heating and ventilating ducts—are speeding production, nailing down new markets . . . by converting to *Kaiser Aluminum.* The problems solved by them can help *you.* So call in a Permanente engineer *today!*

Ready to serve you—*today...*

Kaiser Aluminum

a Permanente Metals product

DISTRIBUTED BY PERMANENTE PRODUCTS COMPANY, KAISER BLDG., OAKLAND, CALIFORNIA . . . WITH OFFICES IN:
Seattle • Oakland • Los Angeles • Dallas • Wichita • Kansas City • St. Louis • Atlanta • Minneapolis • Milwaukee • Chicago
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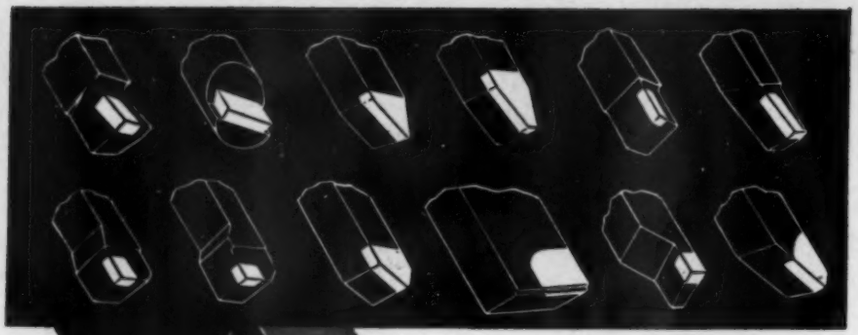


Wendt-Sonis Standard Carbide Tools are available in a wide variety of types and sizes.

for COST CUTTING . . . . . on CUTTING JOBS

- *13 standard Wendt-Sonis carbide tipped tools will perform over 80% of your tool bit operations.*
- *Wendt-Sonis standard tool bits can be supplied with any grade of carbide required.*
- *Standard Wendt-Sonis tool bits are stocked in Carboloy and Kennametal grades of carbide for universal machining operations.*
- *Nationwide sales and service organization of established W-S distributors stocks a complete line of W-S standard products.*

W-S standard tool bits are "Color Marked" for easy identification as to use on steel or non-ferrous materials. All shanks are rust resistant—also heat-treated for greater rigidity. Cutting edges are diamond ground for longer wear and better finish. Use W-S carbide tools to increase your production . . . combat rising costs!

Free! NEW CHIP-BREAKER CHART

Contains illustrations of chip-breakers, grinding instructions, and recommendations for their use. Chart size—with handy tab for wall hanging. To get FREE chart WRITE: Wendt-Sonis Company, Hannibal, Missouri or 580 N. Prairie Ave., Hawthorne, Calif.; also Wendt-Sonis Chicago Warehouse, 1361 West Lake St., Chicago, Illinois.

WENDT SONIS

CARBIDE TIPPED CUTTING TOOLS

BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS • CUT-OFF TOOLS • DRILLS • END MILLS • FLY CUTTERS • TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER TURNING TOOLS • SPECIAL BITS

ing just outside the large service door. "Ah!" I says to myself as I strutted forth to give him the once-over, "Maybe this is the answer!"

"Are you the chap'oo 'as charge 'ere?" he asked, as he removed his cap in deference.

"Sure, you lookin' for a job?" I followed, flicking the ashes from my cigar. Without waiting for a reply, I concluded, "What can you do?"

The poor chap looked as though he hadn't had a square meal in a couple of weeks. His face took on that expression of revived hope as he bashfull wrung the cap out of shape.

"Oo, me? Oh, this an' that. Tinker about 'ere an' there."

"Can you do a good job at soldering?" I asked, thinking about the cutting-compound system being installed at the various machines.

"Righto!" he replied quickly, "an' a bang up job of it too."

"All right," I came right back at him, "come in at seven in the morning," and thereupon, the important transaction being completed, I started to walk away.

"What time do I go 'ome for breakfast?" he called happily.

"What time do you go home for breakfast!" I frowned. "Have your breakfast before you come to work. Are you in the habit of going home for breakfast?"

"Over 'ome we does," he smiled timidly. "Then we works to about ten and then we 'ave a spot o' tea—'course we 'as a good go at it at noon."

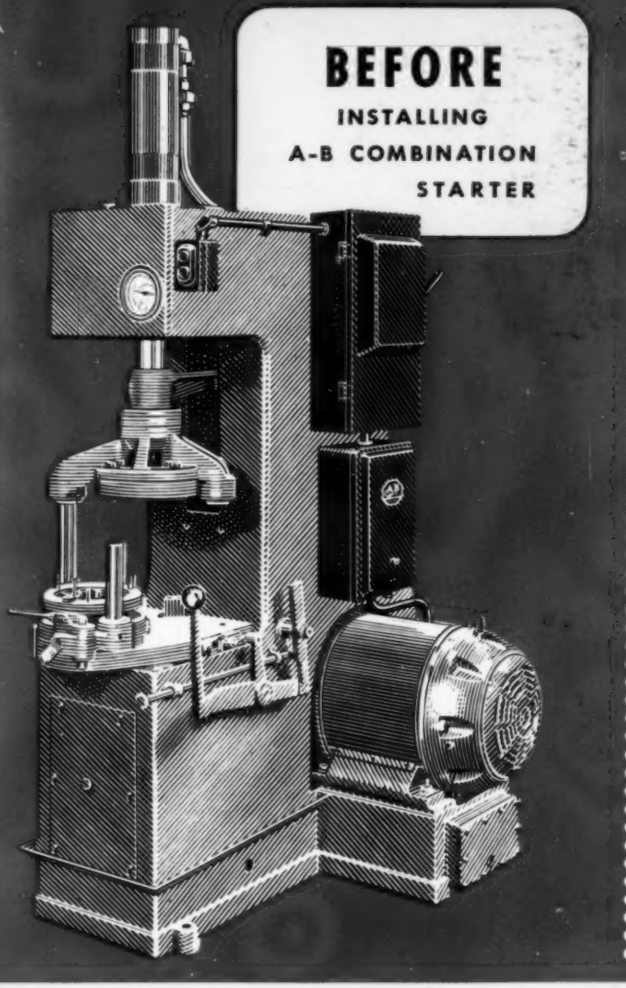
"Hmmmmm!" I puzzled. "Then what happens in the afternoon after you've done a little work? Have some more eats?"

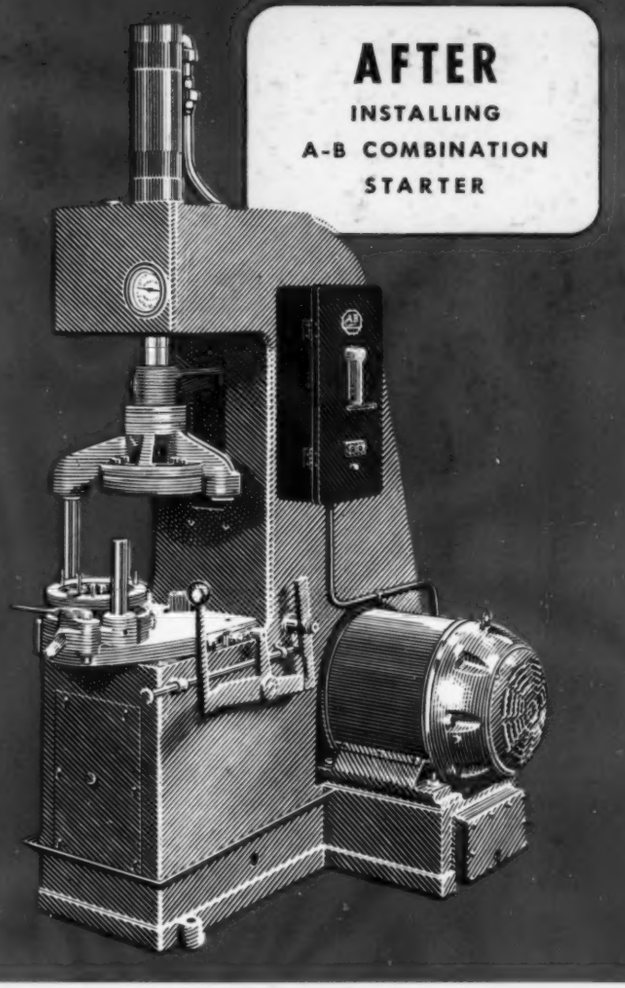
"No," he laughed good-naturedly, as he gave me a nudge, "more tea."

This went on for about five minutes and I gathered his homeland schedule went something like this: Work — breakfast — work — tea — work — snack — work — tea — and so on until time for prayers at night. Finally, I gave him a gentle slap on the back and sent him on his way with: "You eat your bloater and fried tripe before you come to the shop and don't take any tea until noon. Do the same in the afternoon and then, if you feel so inclined as you reach home, fill your belly up for another go at it in the morning."

He was an answer to my prayers. Although he wasn't a toolmaker, his usefulness developed more and more, which ultimately relieved my more expert men to important assignments.

John Homewood
Ontario, Calif.

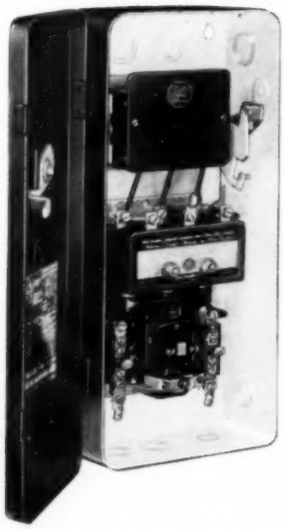




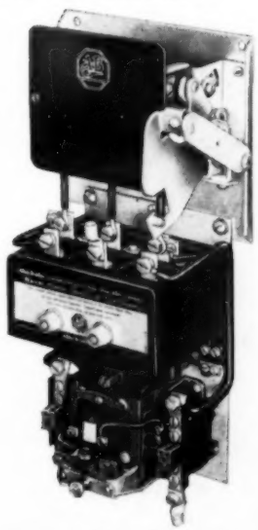
THREE UNITS REPLACED BY ONE COMBINATION STARTER

Saves Space—Reduces Cost—Makes Neater and Safer Installation

BULLETIN 712 COMBINATION STARTER



Cover cannot be opened unless disconnect lever is "OFF."



Disconnect unit and switch are mounted on one back plate.

● Compactness . . . that is a requirement of modern machine tool design.

For example: The old way (see above) called for three separate units . . . (1) disconnect switch . . . (2) motor starter . . . and (3) push button station.

The new way (see above) calls for ONE unit . . . an Allen-Bradley Combination Starter, with push button, magnetic switch, and disconnect unit in ONE neat cabinet.

This compact construction saves space . . . reduces cost . . . makes a neater and safer installation. For full information send for Bulletin 712-713 describing A-B Combination Starters in various types of enclosures.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

ALLEN-BRADLEY

COMBINATION STARTER

The Starter that introduced a New Era *in Automatic Motor Controls*

When Allen-Bradley engineers combined the straight-line motion of a solenoid plunger with the high arc-disruptive action of confined, silver alloy contacts, a new era in automatic motor controls was born.

The Solenoid Principle

The solenoid principle permitted a switch design of unmatched simplicity . . . a starter so devoid of trouble-breeding parts, like pins, pivots, bearings, etc., that the Allen-Bradley solenoid starter was recognized everywhere as "trouble-free."

The Contactor Design

The contactor design, utilizing double break contacts of Allen-Bradley patented silver alloy, did away with the old, complex arrangements of lever arms, hinges, flexible jumpers, and rolling-type contacts.

For the first time in all control history, the feature of NO CONTACT MAINTENANCE was made available to control users.

Double break, moving contacts mounted on insulating crossbar.

Today, every Allen-Bradley solenoid starter carries the instruction—"NEVER CLEAN, FILE, OR DRESS THE CONTACTS." Why? Because the silver oxides which may form on the contact surfaces are good conductors. To file the contacts would only waste valuable contact life.

You can install Allen-Bradley Bulletin 709 Solenoid Starters . . . and forget them.

Sectional View of A-B Solenoid Switch without Overload Relays.

The Allen-Bradley line of solenoid starters includes six sizes, ranging up to 200 hp. White cabinet interiors make wiring easy. Enclosures are available for every service.

Only ONE Moving Part

DEPENDABLE, TROUBLE-FREE PERFORMANCE

. . . Precision High-Speed Switching for Automatic Sequence Controls

Freedom from complicated linkages, pivots, and hinges makes the simple Allen-Bradley solenoid switch ideal for controlling machine tools. Allen-Bradley switches open and close with split-second accuracy . . . not once or twice . . . but continuously. Such precision is now accepted as "standard" by many machinery builders who depend upon Allen-Bradley controls for high-speed, sequence operation of their machine tools.

Let us send you Bulletin 709.
Allen-Bradley Co., 1316 So. Second St., Milwaukee 4, Wis.

ALLEN-BRADLEY
QUALITY
SOLENOID MOTOR CONTROL

Broached HINGES FIT BETTER— Cost Less!

The section in color on each of the parts shown is broached in one operation with tooling designed and built by Detroit Broach Company. In producing close-tolerance, smooth operating hinges, broaching eliminates operations and provides many times greater production per hour.

Through broaching, these savings may be applied to high production parts of many kinds that must mate perfectly. Detroit Broach will gladly select the operations where broaching will save money on *your* parts . . . then give you complete cost and production data for each.

Write today.

DETROIT *Broach* COMPANY

20201 SHERWOOD AVENUE
DETROIT 12, MICHIGAN

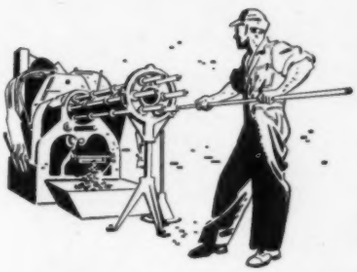
Useless Parts

This part utilizes all common operations of a modern six-spindle automatic screw-machine.

WITH A USEFUL PURPOSE

—to give you better

MACHINABILITY



Millions of these little steel parts have been made during the past 17 years on modern automatic screw machines in the Republic Union Drawn plant at Massillon. And even though not a single one can be used for a practical application, every part has served a very useful purpose.

They are standard test parts—specially designed to incorporate all common machining operations on an "automatic".

In producing them, tons of steel of all standard and many experimental analyses have been cut up by an experienced operator under actual shop conditions. Various speeds and feeds have been employed and records carefully kept of the behavior of the steel, surface finish, tool life and production time.

During all these tests, Republic metallurgists and engineers have made an intensive study of the records to learn more about the machining characteristics of steel—with these results:

1. Substantial improvement made time after time in the machinability of Republic Union Cold Drawn Steels.
2. The development of new free-machining steels.
3. The helpful tables of recommended speeds and feeds in the Union Drawn Steel Handbook.
4. Assistance given to hundreds of parts producers by Union Drawn Field Men.

This full knowledge of the behavior of cold drawn steels as they are used under all conditions in actual plant production is one of the reasons why Republic Cold Drawn Steels are "out front" in *MACHINABILITY* today—why Union Drawn metallurgists and engineers frequently can help you improve quality, step up production efficiency and cut unit costs.

REPUBLIC STEEL CORPORATION
Union Drawn Steel Division • *Massillon, Ohio*
GENERAL OFFICES • **CLEVELAND 1, OHIO**
Export Department: Chrysler Building, New York 17, New York

Republic

REPUBLIC STEEL REG. U. S. PAT. OFF.

UNION COLD DRAWN STEELS

Free-Machining Bessemer, Alloy and Enduro Stainless Steels
•
Union Cold Drawn Special Sections
•
Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting.)

BALDWIN

SOUTHWARK

COMPRESSION

MOLDING PRESSES

for METALS PLANTS that produce PLASTICS.... a press with a name you know!

Standard Line—"Custom" Features...

- ★ HY-SPEED ADVANCE
- ★ ADJUSTABLE AUTOMATIC SLOW-DOWN
- ★ RAPID RAM RETURN
- ★ EXTRA SAFETY CONTROLS:

  Provide protection for the operator
  Prevent damage to mold and press

Standard models available from 50 tons to 300 tons capacity. Ask for Bulletin 251.

Ask for NEW Bulletin 251

BALDWIN

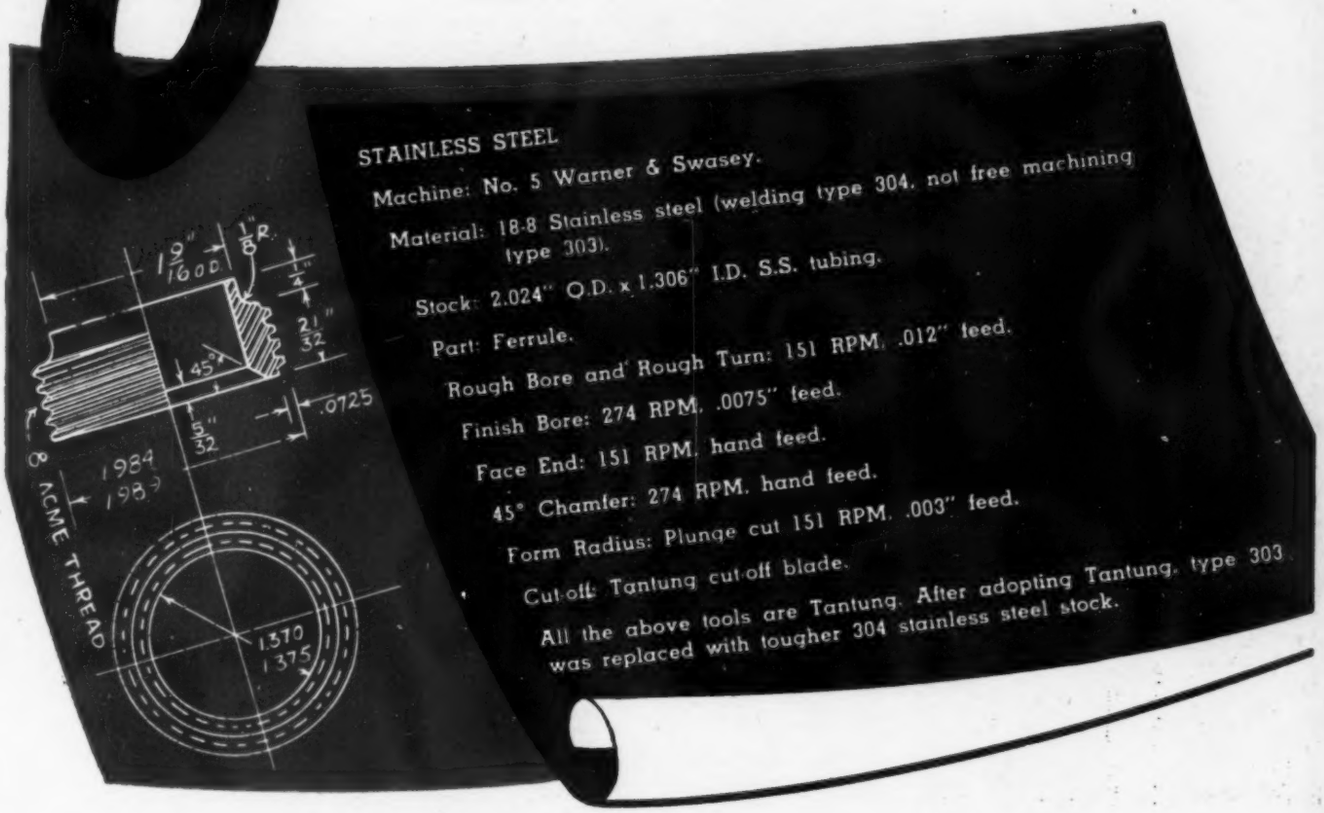
HYDRAULIC MOLDING PRESSES

The Baldwin Locomotive Works, Philadelphia 42, Pa., U. S. A. Offices: Philadelphia, New York, Boston, St. Louis, Chicago, Birmingham, Houston, Cleveland, Detroit, San Francisco, Washington, Seattle, Pittsburgh.

Report No. 6

TANTUNG TOOLS AND STAINLESS STEEL

Facing, Boring, Turning, Chamfering, Forming and Cut-off with Tantung


STAINLESS STEEL
Machine: No. 5 Warner & Swasey.
Material: 18-8 Stainless steel (welding type 304, not free machining type 303).
Stock: 2.024" O.D. x 1.306" I.D. S.S. tubing.
Part: Ferrule.
Rough Bore and Rough Turn: 151 RPM, .012" feed.
Finish Bore: 274 RPM, .0075" feed.
Face End: 151 RPM, hand feed.
45° Chamfer: 274 RPM, hand feed.
Form Radius: Plunge cut 151 RPM, .003" feed.
Cut-off: Tantung cut-off blade.
All the above tools are Tantung. After adopting Tantung, type 303 was replaced with tougher 304 stainless steel stock.
1.370
1.375
8 ACME THREAD
.0725

The machining of high chrome and nickel, stainless steels, cold rolled and copper alloys, from free cutting brass to Beryllium copper has proved Tantung's superiority. In many instances, tool life is increased up to 1200%.

In machining stainless steels, Tantung's lubricating characteristic makes stainless steel chips SLIDE over the top surface without cratering the tool. Since Tantung has a much higher red hardness than H.S.S. tools and a higher transverse rupture strength than average cast alloy tools, it is ideally suited for operation under excessive vibration, shock and interrupted cuts.

Remember—don't "baby" Tantung. Tantung produces more pieces per grind at speeds and feeds far above standard H.S.S. tools.

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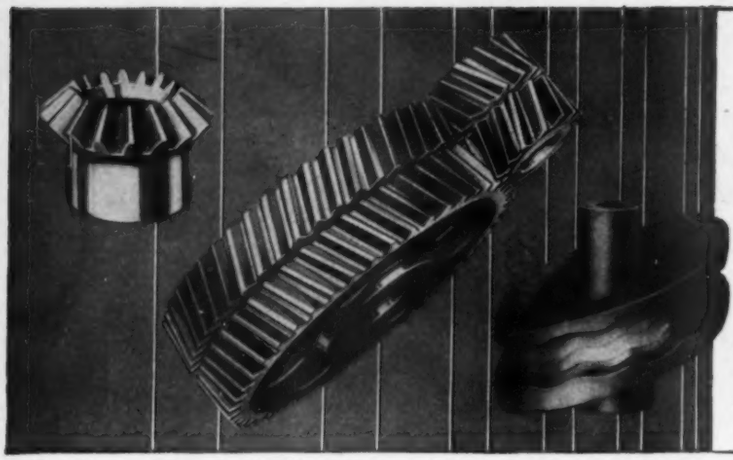

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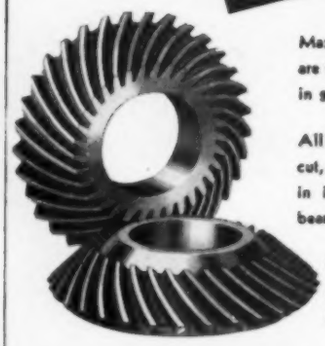

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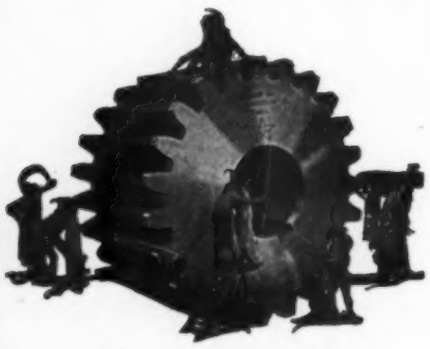

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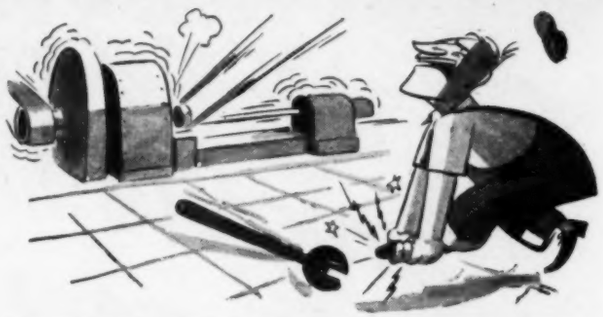

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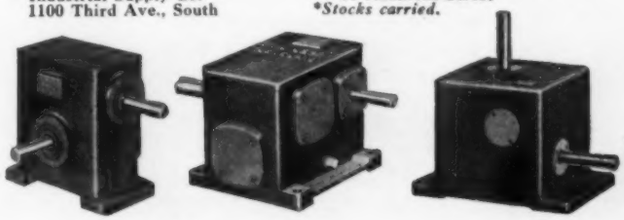

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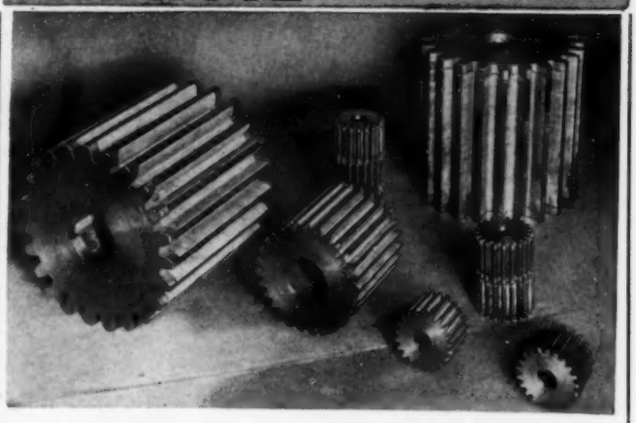

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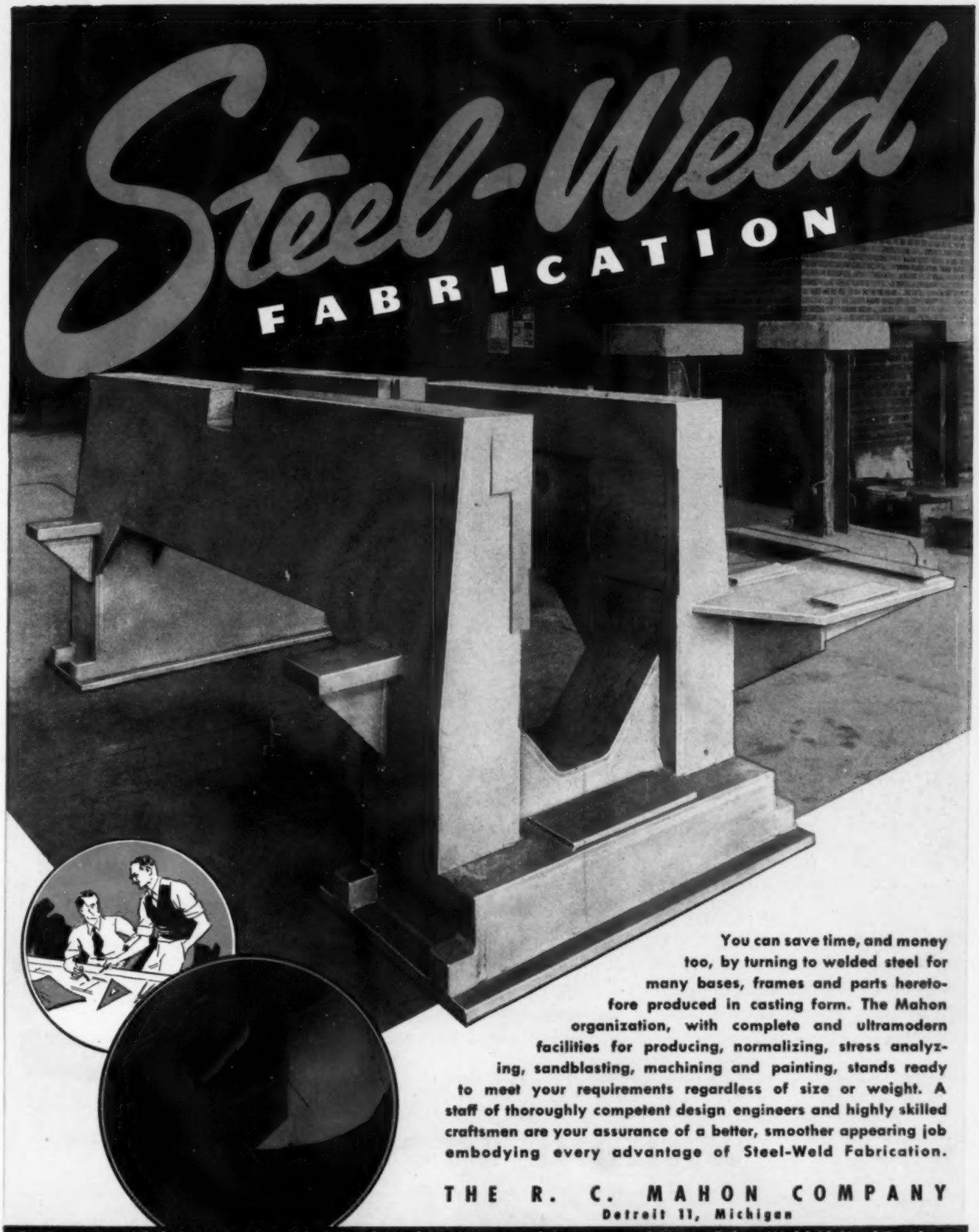

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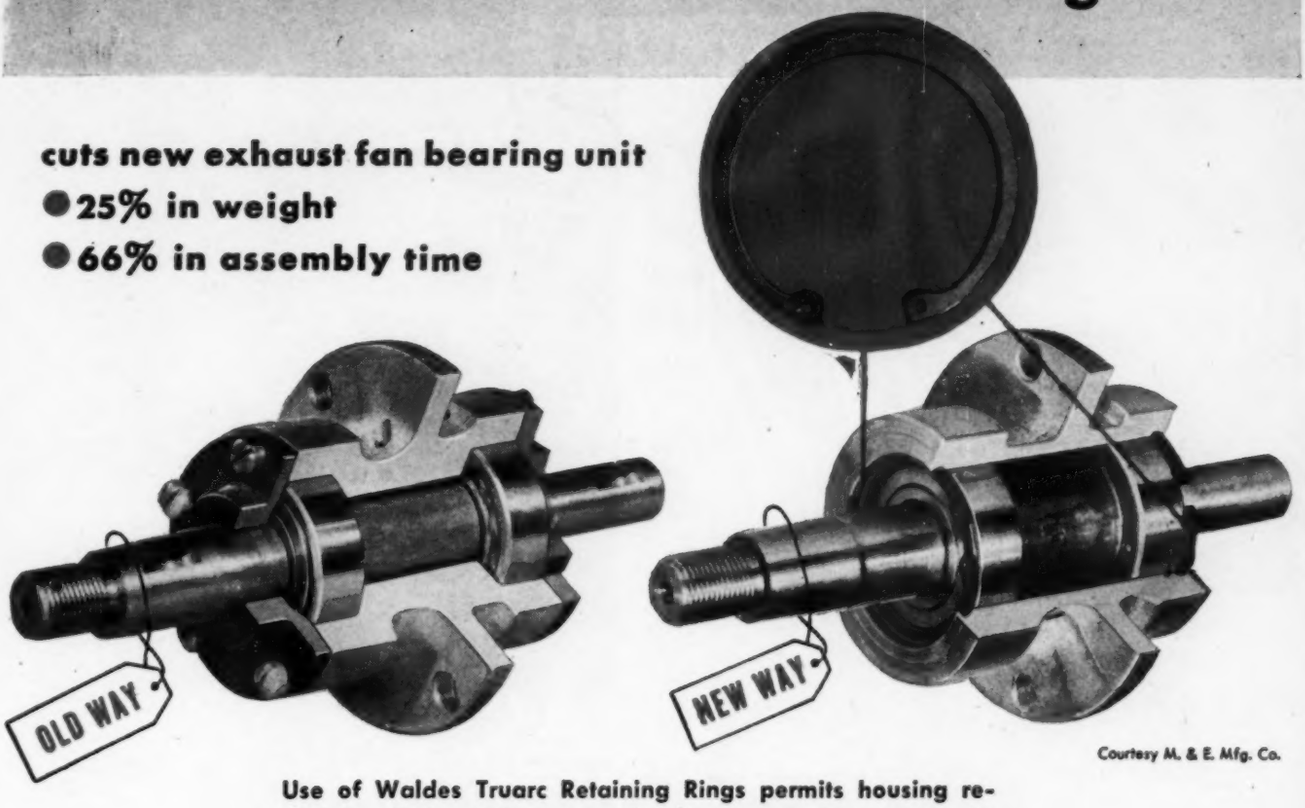

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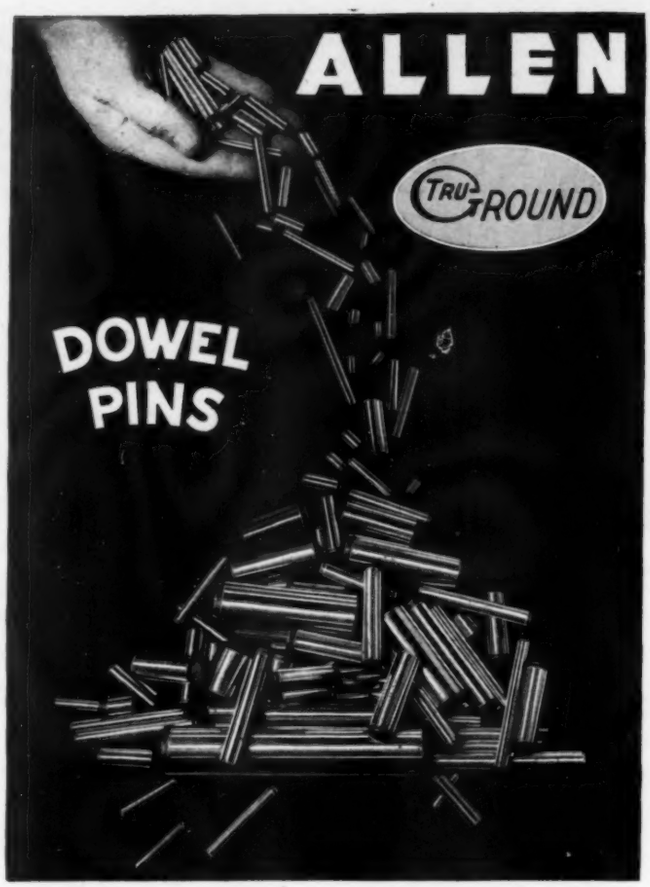

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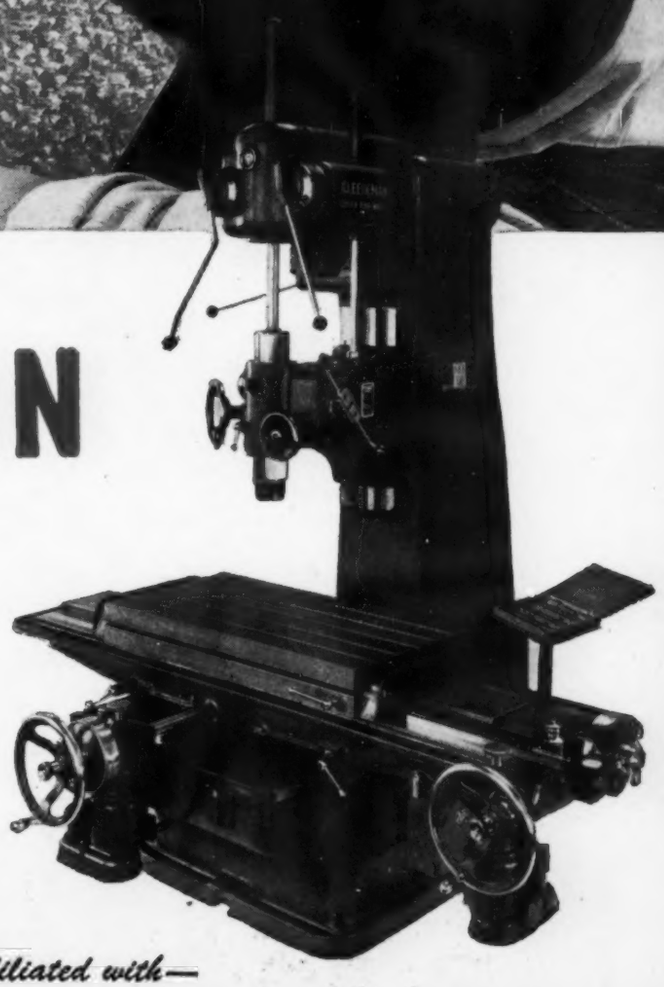

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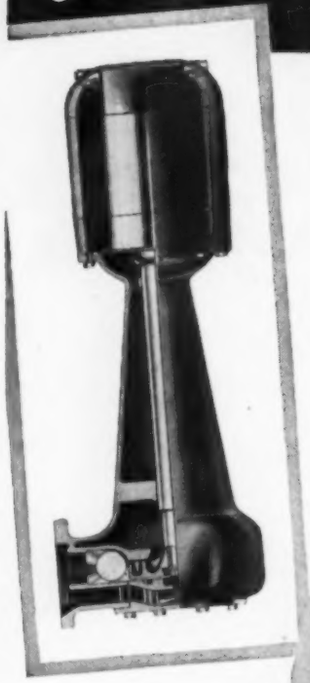

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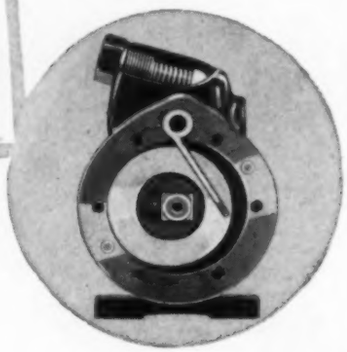

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Pioneer Pumps in Impeller and Rollway designs for pumping coolants, cutting fluids, abrasive liquids, lubricants and water available in every type and size. Please specify your needs when writing for information.

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HIGH-POWERED PRECISION SURFACE GRINDERS

● Rugged, High Powered and Versatile, Mattison Precision Surface Grinders with double-column construction are built to handle your grinding jobs on a real production basis, providing repeated precision results and a fine finish.
They are built with table sizes from 12" to 36" wide by 36" to 192" long. To appreciate what these machines can do we suggest you stop at Booth Number 46 at the Machine Tool Show where different sizes of the latest type Mattison Grinders will be in operation.

WIDE ABRASIVE-BELT GRINDING and POLISHING MACHINE

● From the time factory coated abrasives were introduced for metal polishing and grinding, Mattisons have developed and built machines properly applying belts to do the job to be done. The Wide-Belt Sheet Grinder and Polisher shown above is for finishing stainless steel and alloy sheets in sizes up to six feet wide and sixteen feet long. To see what this machine is capable of doing stop in at Booth Number 46 during the Machine Tool Show September 16 through the 27th.

MATTISON MACHINE WORKS

ROCKFORD • ILLINOIS

AFTER YOU GET BACK FROM THE SHOW...

don't get off this one train of thought

Don't sidetrack all those ideas on new products, markets and cost-reduction which you brought back, red hot, from Chicago — just because you lack plant facilities, equipment, or hours in the day.

Take your new ideas — or your bothersome old problems—to Taft-Peirce, where you will find all these services and products at your ready command:

Engineering, Tooling, Contract Manufacturing: To your specs or blueprints, the T-P Contract Division will tool and produce anything from a single tool or part to complete mechanisms in lots of any quantity.

Special Gear Cutting & Grinding, Thread Milling & Grinding: A new department with ample capacity for cut or ground gears and threads of all types.

Standard Machine Tools: The No. 1 Precision Surface Grinder and the 6″ Rotary Surface Grinder for high precision and fine finish on small flat work. The New Taft-Peirce Spline and Gear Grinder. The Taft-Peirce Back Spot Facing Machine.

Production and Inspection Tools: Sine bars and fixtures, squares, surface plates, bench centers, angle-measuring equipment, etc.

Standard & Special Gages: All types of AGD Standard plain and thread plug, ring, and snap gages. Special designs to specification. The new Taft-Peirce CompAIRator air gage.

Magnetic Chucks: Rectangular, rotary, and tilting-base chucks of exclusive T-P SUPER-POWER design. Magnetic V-blocks and angle plates.

Write to The Taft-Peirce Mfg. Co., Woonsocket, R. I.

. . . for Engineering, Tooling, Contract Manufacturing

TAKE IT TO TAFT-PEIRCE

WHY DAYTON V-BELTS Start and Run Smoothly

Machines that twist wool fibers and run the yarn onto spools are delicate. Power drives must start and run smoothly or machines quickly get out of order. In the plant of a manufacturer of papermakers' felts, rough starting and stopping, plus the slipping of the original power drive on a twister machine, caused it to be out of operation frequently for hours at a time. Loss of production was serious. Then, five years ago, a Dayton V-Belt Drive was installed. Since then the twister has not been out of service once due to power drive failures.

Dayton V-Belts start, run and stop smoothly because they wedge themselves in the pulley groove, thereby absorbing the shocks of suddenly applied power when motors are started or when peak loads suddenly come on. Smooth starting is one of many reasons why Dayton V-Belts can help you solve your power transmission drive problems efficiently and economically. Your Dayton Distributor will gladly help you. Call him today.

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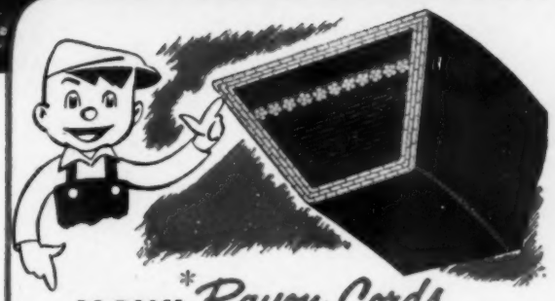


NOW! *Rayon Cords

PROVIDE DAYTON V-BELTS WITH

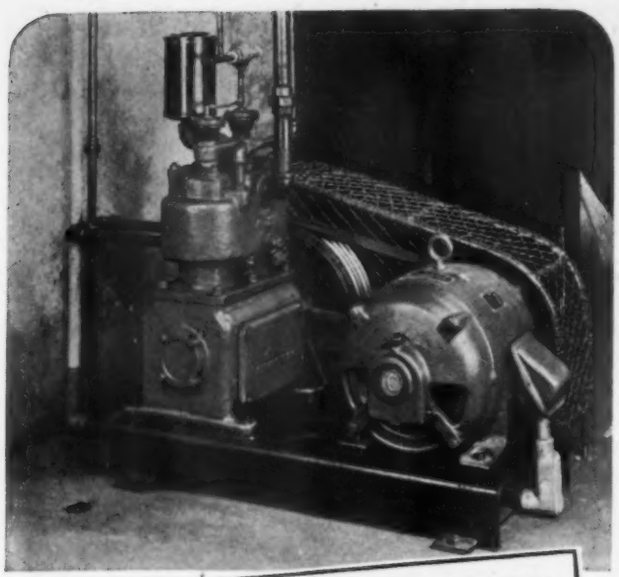
1. **MINIMUM STRETCH**
2. **GREATER FLEX STRENGTH**
3. **LONGER V-BELT LIFE**

*Rayon cords are specially processed by Dayton for use in V-Belts to provide the most efficient and economical power transmission service for your needs. For the complete story, write for booklet A-469.

V-BELT BUYERS! A leading mill supply house near you stocks Dayton V-Belts... look for the name in the yellow pages of your telephone directory

Dayton Rubber

THE WORLD'S LARGEST MANUFACTURER OF V-BELTS



CURTIS AIR COMPRESSOR

After 27 Years of Service—Replaced by Curtis Timken Bearing Compressor

THE record of 27 years of dependable service operating tools and keg testers for a nationally known cooperage company is a real tribute to the long, trouble-free life of Curtis Air Compressors. During these years, *clean, oil-free* air was essential and the company enjoyed completely satisfactory service from their Curtis unit.

For the most dependable, efficient and economical supply of air, you can depend on Curtis Air Compressors year after year. Engineering advantages include:

- Timken Bearings
- Carbon-free disc valves
- Positive pressure lubrication—self-oiling
- Automatic pressure unloader
- Fully enclosed
- Precision built

Write for full information on Curtis Air Compressors, Air Hoists and Air Cylinders.

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
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Please send me Form C-7 on Curtis Air Hoists, Air Cylinders and Curtis Air Compressors.

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Firm.....
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City.....*Zone*.....*State*.....

93 Years of Precision Manufacturing

SAVE ON LIGHT PRESSWORK WITH A famco FOOT PRESS

Production line economies are accomplished wherever one, or a whole battery of Famco Foot Presses are used to do light punching and forming jobs. Famco presses eliminate cumbersome, space-consuming equipment that use up electric power. Pictured above is a typical installation of Model 8 S Famco Foot Presses, putting pep into production at Webster Electric Co. of Racine, Wisconsin. Each of the ten sturdy, foot-powered models can be located anywhere . . . they require no wiring, motors or line shafts. Their effortless operation makes them ideal for women employees to attain speed and accuracy, without tiring. Investigate the cost-cutting possibilities of Famco Foot Presses.

OTHER POWERFUL MACHINES THAT NEED NO POWER

Famco Arbor Presses, in 32 models, bench and floor mounting, will deliver up to 15 tons pressure . . . require no electric power.

Famco Foot-Powered Squaring Shears will cut up to 18 gauge mild steel with accuracy and speed. Ruggedly constructed and available in five sizes.

FAMCO MACHINE CO. • 1316 18TH ST. • RACINE, WIS.

famco COST CUTTING machines

ARBOR PRESSES • FOOT PRESSES • SQUARING SHEARS

Difficult?

not with a ROCKFORD Hy-Draulic

The "difficult" jobs are never a problem when you have a Rockford Hy-Draulic Shaper. Put on any of the special jobs that are often tough to set-up or do . . . and see how fast and accurately such work can be done. The special job shown here on a production part for a South Bend Lathe is typical . . . a keyway only 0.500″ long. In addition to cutting accurately to a blind shoulder at each end with only a clearance of 0.008″, the cut must be held to plus or minus 0.003″ in width and depth. These parts are produced in lots of 250 to 3000 pieces and the keyways are cut in an average time of 30 seconds per piece. If you want speed, accuracy, and true ease in set-up and operation, for every kind of shaper work, investigate the Rockford Hy-Draulic. Write for Shaper Bulletins.

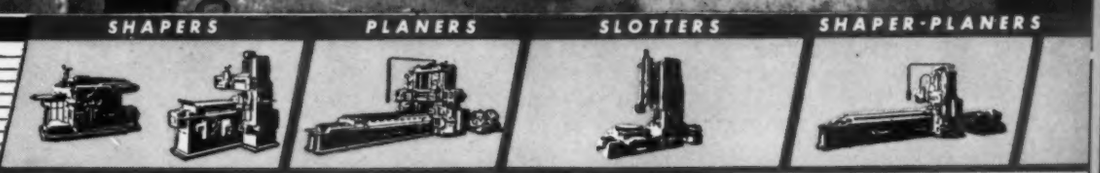
ROCKFORD MACHINE TOOL CO.
ROCKFORD ILLINOIS

ROCKFORD Hy-Draulic SHAPERS

• • • •

Ram type Shapers are built in 12″, 16″, 20″, 24″ special, 24″, and 28″ sizes . . . Openside Shaper in 36″ size. Available with all accessory equipment where it applies, such as universal table and power down feed.

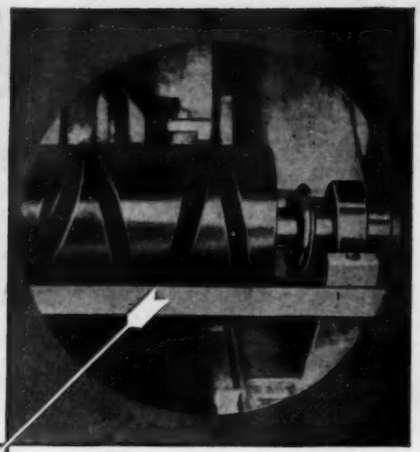
Hy-Draulic

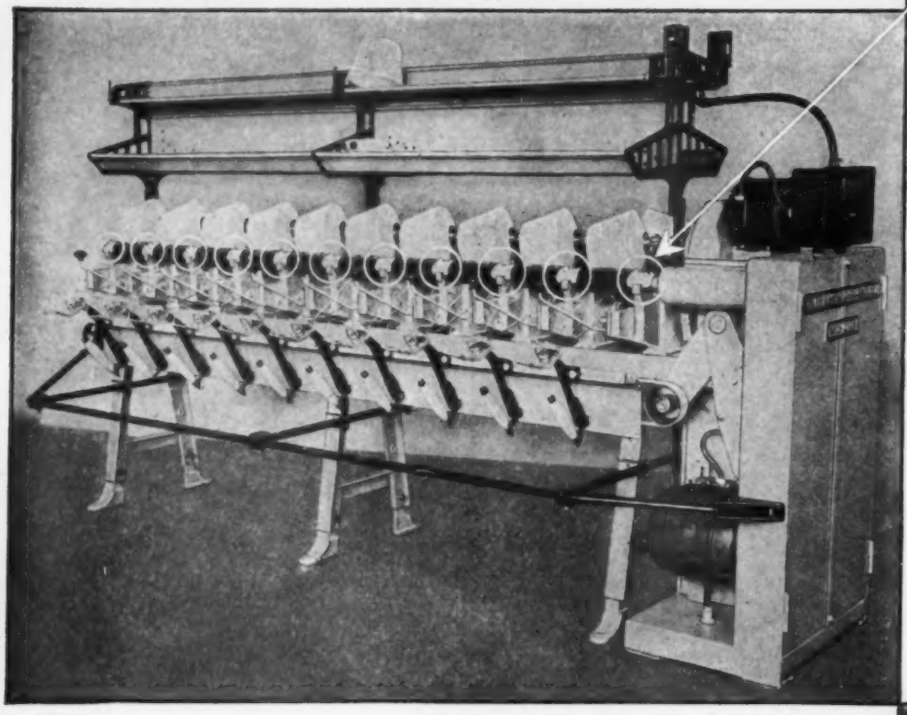


FRICTION PROBLEM?

There is a NICE *answer*

NICE Ball Bearings overcome Friction in modern design of Textile Machinery





Above: Exposed view of bearing mounting.

Left: The Roto-Coner* Winding Machine, manufactured by the Universal Winding Company, Providence, Rhode Island.

Below: Nice No. 6411 Special, a modification of Standard No. 1635 SS of "Series 1600", a new *inch size* line of *low cost* Precision Radial Bearings with Solid Inner and Outer Rings and Ball Retainer.

Typically representative of the modern design employed by the Universal Winding Company of Providence, Rhode Island, is the illustrated Roto-Coner* Winding Machine which incorporates NICE BALL BEARINGS at the Friction points indicated.

Designed especially for this application, these NICE bearings not only help to make possible advantageous design and production features from the standpoint of the manufacturer, but also contribute to increased production, power savings and greater utility to the benefit of the user.

• • •

For price and engineering data on the complete line of NICE BALL BEARINGS and other ANTI-FRICTION PRODUCTS, write for Catalog No. 125.

*Reg. U. S. Pat. Off.

NICE

NICE BALL BEARING COMPANY
NICETOWN · PHILADELPHIA · PENNSYLVANIA

WITH AN EYE ON PRODUCTION *Costs*

AND PRODUCTION *Volume*

HANSEN COUPLINGS

SAVE TIME...CUT COSTS

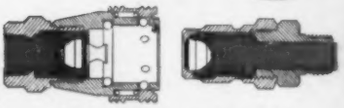
It's the minutes saved on operations repeated many times daily that mount up to substantial savings in time...and money. With Hansen Couplings, connections and change-overs become a matter of seconds with no hold-up of costly operations.

To connect a Hansen coupling, you merely push plug into socket. To disconnect, slide sleeve back with thumb. In both cases, flow is immediately and automatically turned on or off . . . with no time wasted, no losses.

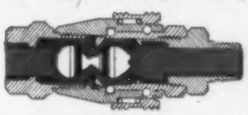
There is a specific Hansen coupling, made for air, oil or grease, for oxygen, and for acetylene. Available in a wide range of standard sizes.

Write for catalog describing full line of Hansen couplings and fittings for industrial use.

The Hansen Two-Way Shut-Off Coupling.



Red section shows how rubber washer in valve stem contacts valve seat in both plug and socket, sealing both plug and socket against leakage instantly.



Red section shows flow of liquid or gas around spool section of valve, permitting free flow of liquid or gas through coupling instantly upon connection.

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You Asked For It!

DURMA-GARD
PROTECTIVE APRON

Designed by YOU to Help your Safety Program

PERMANENTLY FUSED EYE-LETS WITH STRONG TIE-CORDS

NO CLOTH STITCHING REINFORCED STRESS POINTS

SPECIALLY CONSTRUCTED TROUGH CATCHES DRIPPINGS

During a recent on-the-spot field survey, West talked with hundreds of industrial workers and safety engineers to determine what features they would like to see incorporated in a protective apron. The new Durma-Gard is the result—your own idea!

Durma-Gard is a *completely new* protective apron that provides *maximum safety* against acids, alkalis, grease and oils, and effectively resists absorption, dust, powders and other occupational hazards. Yet it weighs no more than 10 ounces, thereby permitting full freedom of movement and unhampered efficiency.

The Durma-Gard Apron also provides a specially-constructed "trough" which catches "drippings", thereby protecting legs and shoes. Made of clear, transparent "Vinylite", Durma-Gard washes readily with soap and water. Full cut, standard size.

Throughout the United States and Canada are close to 500 trained West Safety Consultants. To learn more about Durma-Gard, simply call the West representative nearest you.

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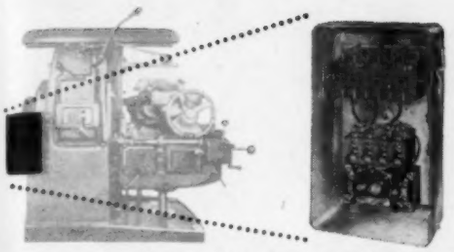
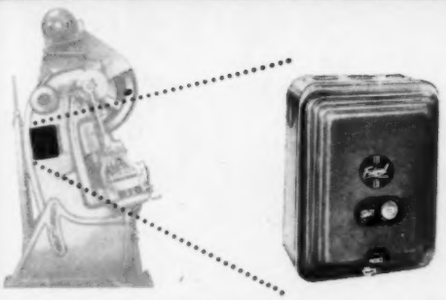
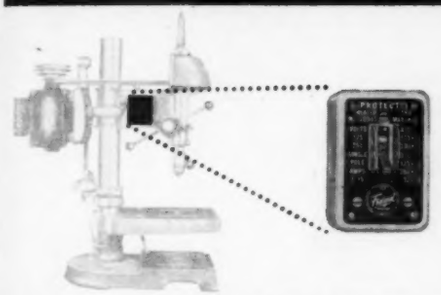


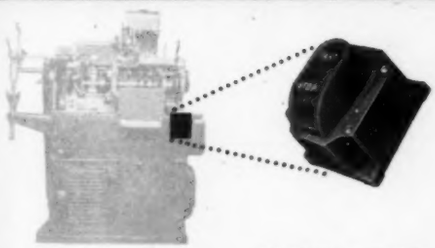
Combination Disconnect Switch and Starter



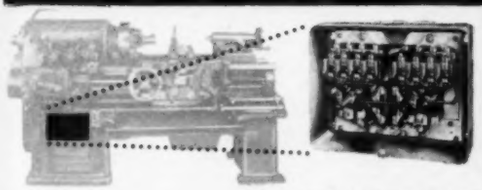
Magnetic Across-the-Line Starter



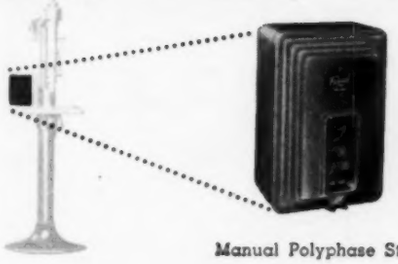
Manual Starter for Fractional H.P. Motors



Oil Tight Control Station



Reversing Magnetic Starter



Manual Polyphase Starter

"Take it from me-

a machine tool is only as efficient as its motor control"

"In a machine tool, it's performance that counts . . . and performance starts and stops with the motor control. When you can count on unfailing circuit protection against overloading . . . an instantaneous choice of automatic or manual reset—with a minimum of maintenance—you've got a piece of equipment you can depend on to stay on the job through the heaviest production schedule.

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● Need tool steel? Midvale tool steel bars carried in wide assortment —all common grades and shapes warehouse-stocked—and ready for one-day shipment. Midvale's tool steel stocks include the Carbon, Oil Hardening, High Speed, Shock Resisting and Special Alloy Grades. Ask for Midvale's stock list. Gives you regular information about Midvale tool steels.

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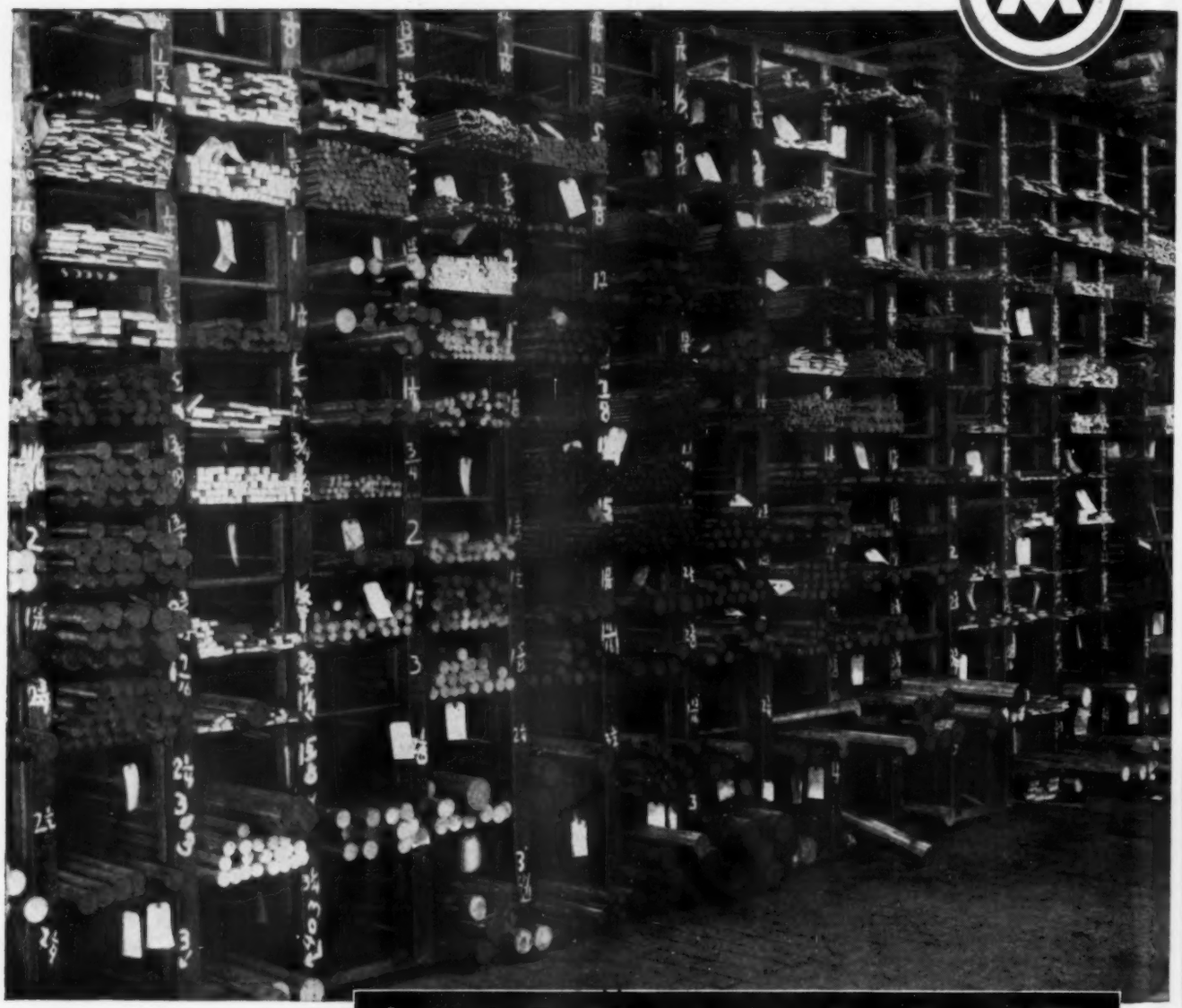

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CORROSION AND HEAT RESISTING CASTINGS
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Custom Steel Makers to Industry

ANNOUNCING

"Standard" AUTOMATIC

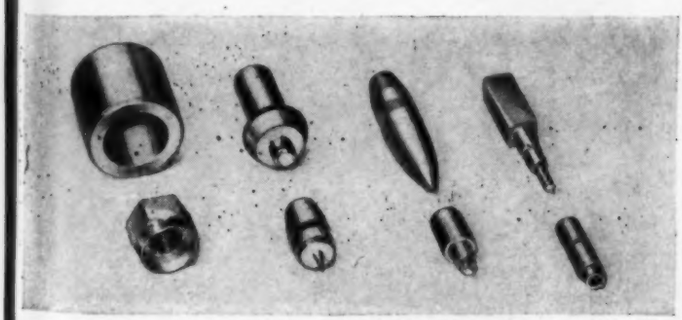
SCREW MACHINE No. 2

Pat. No. 2,373,155
April 10, 1945

WITH NEW PATENTED CHIP BREAKER

Basic machine. Special attachments available include drilling or boring tools, steady rest, etc.

- ★ **Unmatched in price by any machine of similar capacity.**
- ★ **Quick chucking and short cycle of operation increase productivity to new high records.**
- ★ **All controls and adjustments compactly centered at front.**
- ★ **Handles all metals and plastics in bar stock up to 1" diameter.**
- ★ **Harmonic chip breaker prevents formation of long turnings.**



A few samples of work produced on the "Standard" Automatic.

The "Standard" Automatic saves set-up time, speeds production of small work and the low investment permits retention of tool setups for intermittent runs. Don't overlook the many unique features of this revolutionary new machine. Write for descriptive literature and prices.

STANDARD MACHINERY COMPANY

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Mac-it ALLOY STEEL SCREWS

Insure smoother operation at POSITIVE levels with STRIPPER BOLTS!

Mac-it Stripper Bolts or Shoulder Screws have greater holding power where you want it in die-assemblies. They are also used as stud bolts and in various machine assemblies. Easily tightened with Mac-it Key. Will not work loose. *All* Mac-it screws are heat-treated and accurately made with die-cut threads. Whatever your needs, let the *complete* Mac-it line serve you. Sold through recognized distributors from coast to coast and in Canada.

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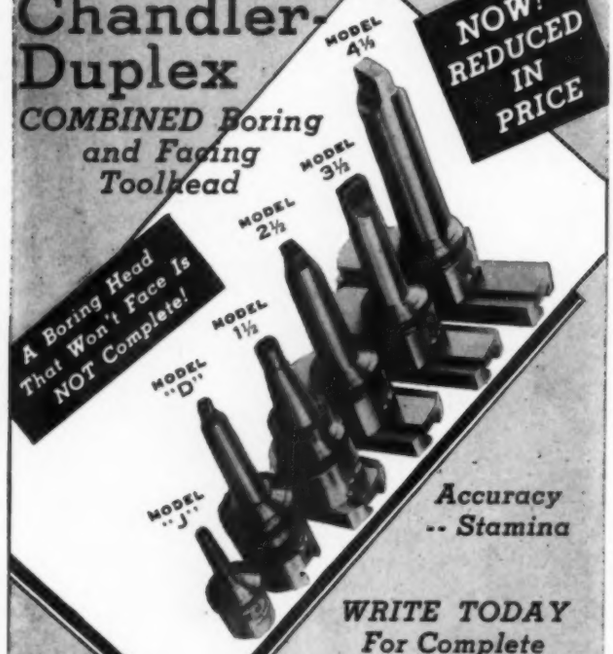
For ANY Size Machine
Chandler-Duplex
COMBINED Boring and Facing Toolhead

NOW! REDUCED IN PRICE



A Boring Head That Won't Face Is NOT Complete!

Accuracy -- Stamina

WRITE TODAY For Complete Details . . . . .

A Few Openings For GOOD Distributors

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MUNCIE, INDIANA, U. S. A.

ERRINGTON MECHANICAL LABORATORY
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MULTIPLE HEADS

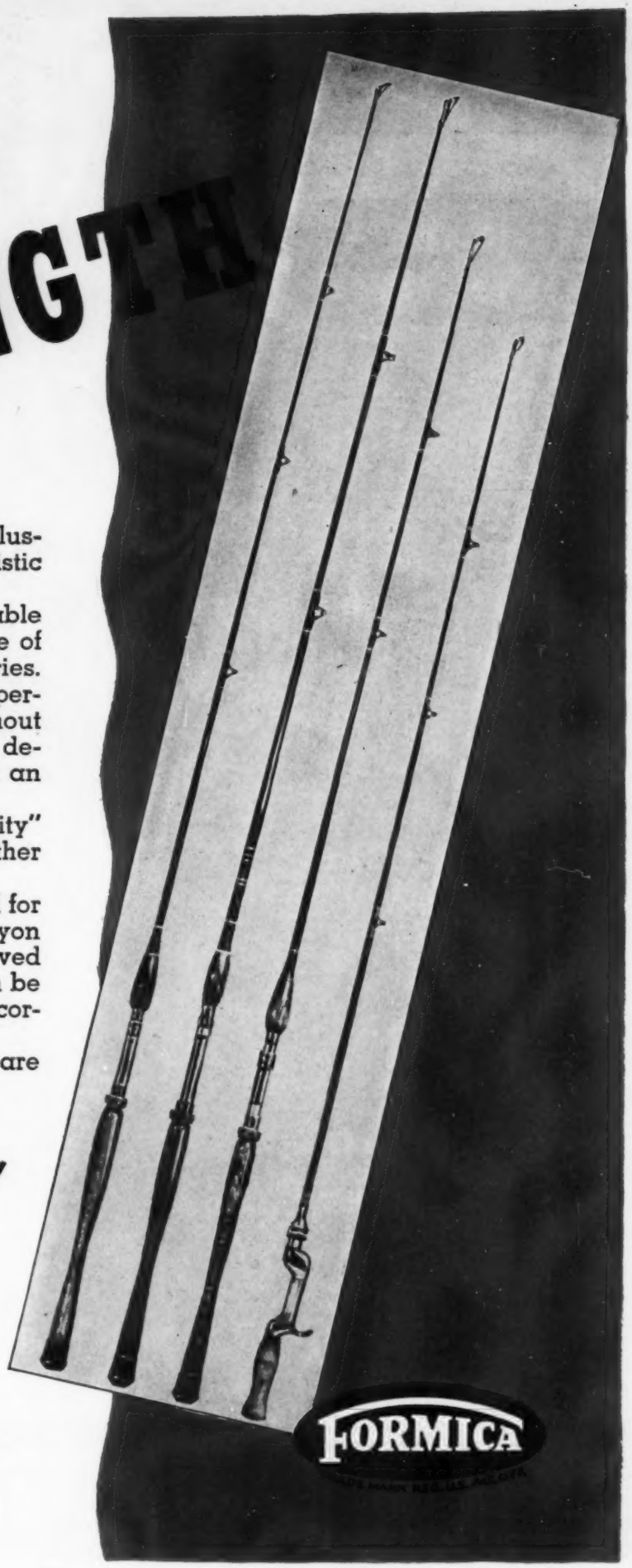
Super-Sensitive Fixed Center Multiple Drilling Heads

Fixed-Center Auto-Reverse Multiple Tapping Heads

All Parts Fully Enclosed to Insure Pressure Lubrication and Rigid Support of Adjustable Spindles

ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD

FLEXIBLE STRENGTH



THE use of Formica for fishing rods illustrates another valuable characteristic of Formica—flexible strength.

That is just one a number of valuable qualities that has opened a broad use of the material in the mechanical industries.

It is a marvelous bearing material, operating under the heaviest loads without scoring or warping from the heat developed—a quality that has made it an ideal material for ways on planers.

Formica has natural "wetting quality" which makes it easy to lubricate either with oil or water.

It is chemically inert and can be used for such things as plating barrels and rayon equipment where the solutions involved rapidly destroy other materials. It can be molded with electrical conductors incorporated into the sheet.

Test figures on all Formica grades are available.

The Formica Insulation Company
4662 Spring Grove Avenue
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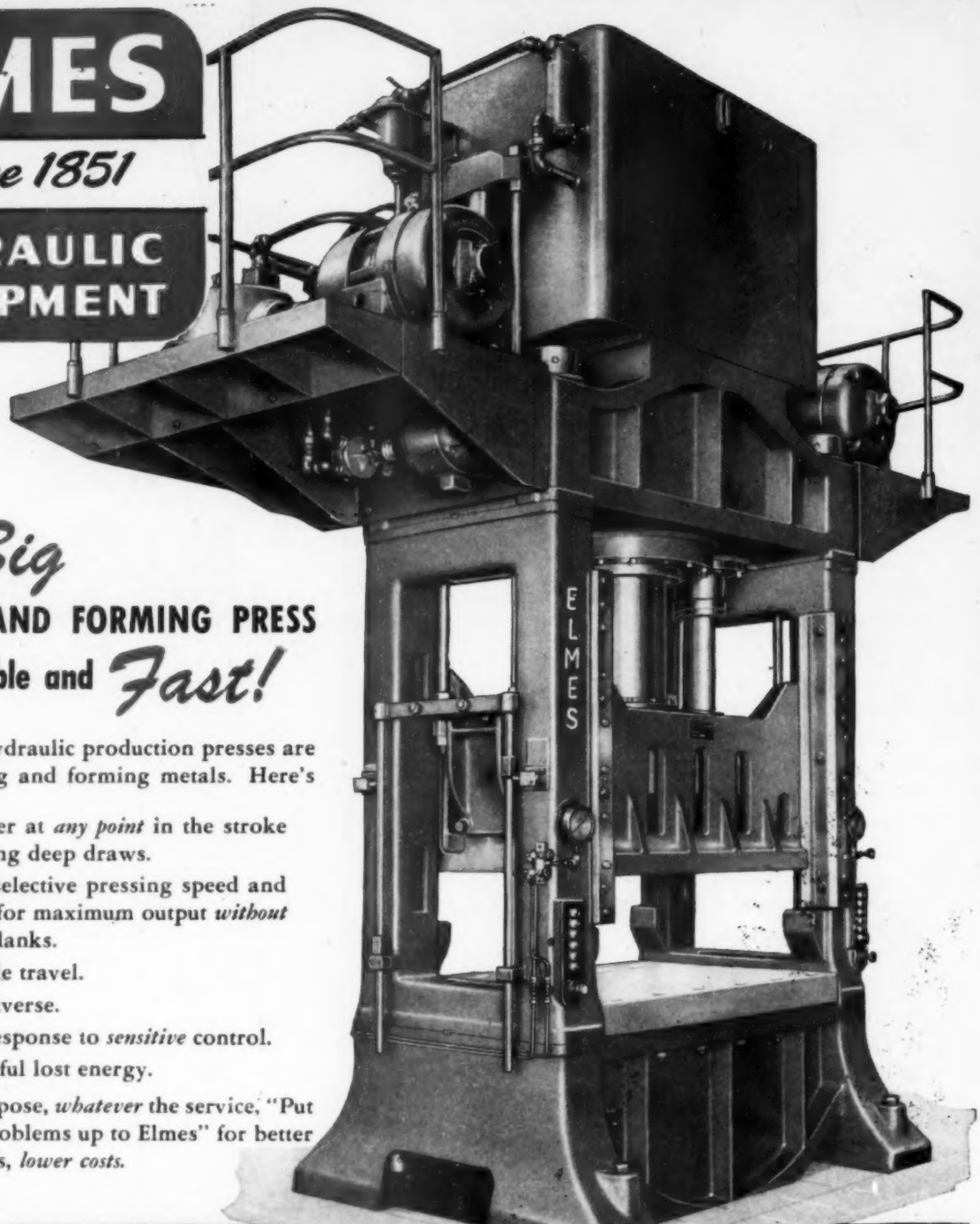
ELMES

Since 1851

HYDRAULIC EQUIPMENT



This *Big* DRAWING AND FORMING PRESS is Flexible and *Fast!*

Modern Elmes hydraulic production presses are *ideal* for drawing and forming metals. Here's why:

- Full power at *any point* in the stroke for starting deep draws.
- Precise, selective pressing speed and pressure for maximum output *without* tearing blanks.
- Adjustable travel.
- Rapid traverse.
- Instant response to *sensitive* control.
- No wasteful lost energy.

Whatever the purpose, *whatever* the service, "Put Your Pressing Problems up to Elmes" for better work, longer runs, *lower costs.*

Illustrated is the Elmes Model 6925 high-speed, single-action 300-ton drawing and forming press with 115-ton intermediate pressure and 100-ton cushion. Rapid ram advance: 900 "/min. Pressing speeds: 140 "/min. (300 tons); 320 "/min. (115 tons). Ram return: 900 "/min. Cushion return: 450 "/min. On a 3½" draw depth this press will make around fifteen cycles per minute. Bed size: 48" F to B; 72" R to L. It has two 75-h.p. motors, a 30"-stroke, and automatic protection against over-travel and over-pressure. Operates at 115 or 300 tons, or any combination of these capacities, on push-button control.

SIMPLIFIED DIE SETTING. To facilitate die setting, small increments of approach are obtained by switching the press to "inching control." Slide then descends only at pressing speed, and only while "down" button is held depressed—opens only while "up" button is held depressed. All safeguards against over-pressure and over-travel are retained. Light dies may be given additional protection by a low-value setting of the pressure switch. Operator gives his full attention to the work, unencumbered by heavy hand wheels or hand levers.

ELMES ENGINEERING WORKS *of* AMERICAN STEEL FOUNDRIES, 1001-13 Fulton St., Chicago 7, Ill.

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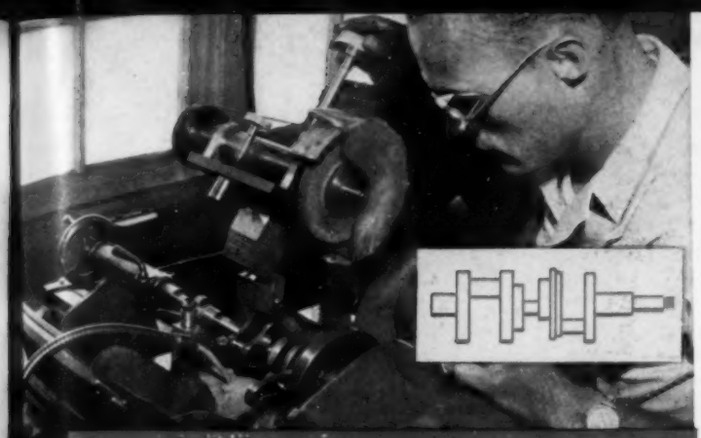
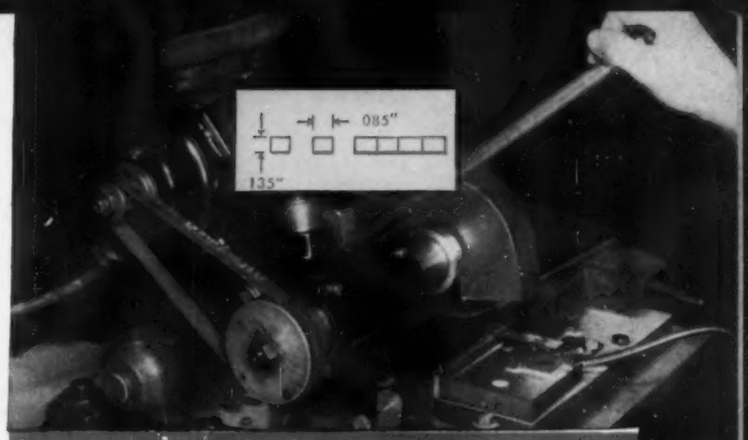


Cam Grinding with Lathe-Mounted Dumore

Cams for outboard-motor crankshafts are ground on this set-up at Martin Motors, Inc., Eau Claire, Wisconsin. A master cam on the work-piece arbor governs contact of the grinding wheel with the cam being ground.

Drilling Lock-Wire Holes in Hex-Head Screws

High-volume production of aluminum hex-head screws was maintained by Zagar Tool, Inc. of Cleveland, Ohio, with the assistance of this special drilling machine. Six Dumore No. 8 HG's comprise the drill work-head.

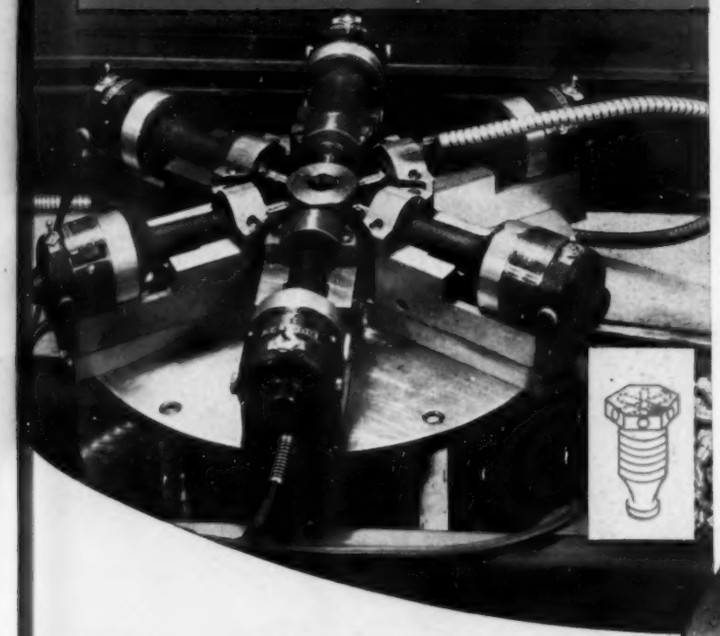


Cut-off Grinding with Special Bench-Mounted Dumore

To cut off tiny roller-bearing segments measuring .085" in length, the W. H. Field Company of Boston, Massachusetts, use this bench-mounted Dumore No. 5 with a fixture to hold and feed the .135" diameter rod.

Undercutting Commutators with Bench-Mounted Dumore

This special milling set-up was devised by The Dumore Company, Racine, Wisconsin, to undercut mica segments in motor commutators. A No. 5 Grinder with T quill saved up to 50% of time over previous method.



*All in the day's work for a Dumore**

the tool that does more for you...

grinding, drilling, and light milling...*at lower cost*

*Trade Mark Reg. U. S. Pat. Off.

The Dumore is well named! It's the tool that *does more* — more and more every day. First famous as a toolroom grinder, the Dumore is so adaptable, it has become a universal shop-tool today.

Yes — you can really do more with a Dumore! *You can do more with your present machines;* a Dumore converts standard tools or used tool-bases into precision grinders. *You can do more with special equipment you build yourself;* a Dumore is a versatile work-head adaptable to almost any job. *You can do more kinds of work;* a Dumore does external, internal, surface, tool, and thread grinding — plus drilling and light milling.

Plan to *do more with a Dumore!* Your distributor can help you avoid investment in expensive equipment, with planned Dumore set-ups. Ask him to specify the Dumores for your special requirements. There are 7 models with interchangeable quills, for internal grinding to 24" depths, and speeds up to 42,500 rpm, for work to ± .0001" accuracy! And don't overlook dependable Dumore Hand-grinders — for more *adaptability that does more for you!*

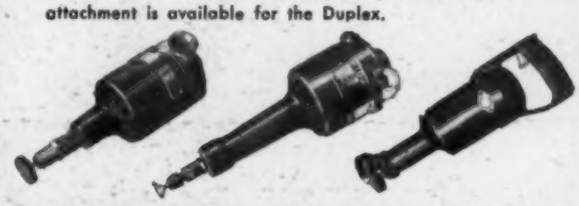
DUMORE

RACINE, WISCONSIN

Sold by leading industrial distributors in all principal cities

Turn the page for information on other Dumore Tools ——▶

You can do countless jobs in any shop with sturdy, serviceable Dumore Handgrinders. Use them as handtools for grinding, burring, scoring, drilling, routing, and many other jobs. Use them as workheads in special set-ups like the drilling machine shown on the preceding page. Select the right size for your needs from the 1/10 HP No. 10 (above), the 1/5 HP No. 9, 1/20 HP No. 8, and 1/14 HP Duplex (below). A flexible-shaft attachment is available for the Duplex.



Your Dumore Distributor knows how to *cut your costs* with Dumore* Tools

You can do more with a Dumore—and your distributor knows how. He is an expert on the Dumore line. He has a file of information showing how countless other companies have saved with Dumore. He maintains a complete stock of the Dumore line to give you prompt delivery and service.

Yes—it's easy to cut toolroom, maintenance, and production costs—with Dumore! Take advantage of your distributor's special experience. Let him explain the cost-cutting possibilities of the entire Dumore line—the seven different Toolpost Grinders, 35 Quills, 4 Handgrinders, high-speed Bench-Drill, Drill Speeder attachment for standard drill presses, and Flexible Shaft Tool — the Dumore Tools that do *more* for you by cutting your plant-wide costs.

Suggestions from Dumore distributors save money for manufacturers every day. They can do the same for you. *Do more with Dumore.* Call your distributor today!

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Toolpost Grinders

Dumore Quills

Handgrinders

Drill-Speeder

High-Speed Drill Press

Flexible Shaft Tool

Turn the page for special information on cost-cutting Dumore Grinders

tear out this coupon and mail today!

The Dumore Company, Dept. L-14, Racine, Wisconsin

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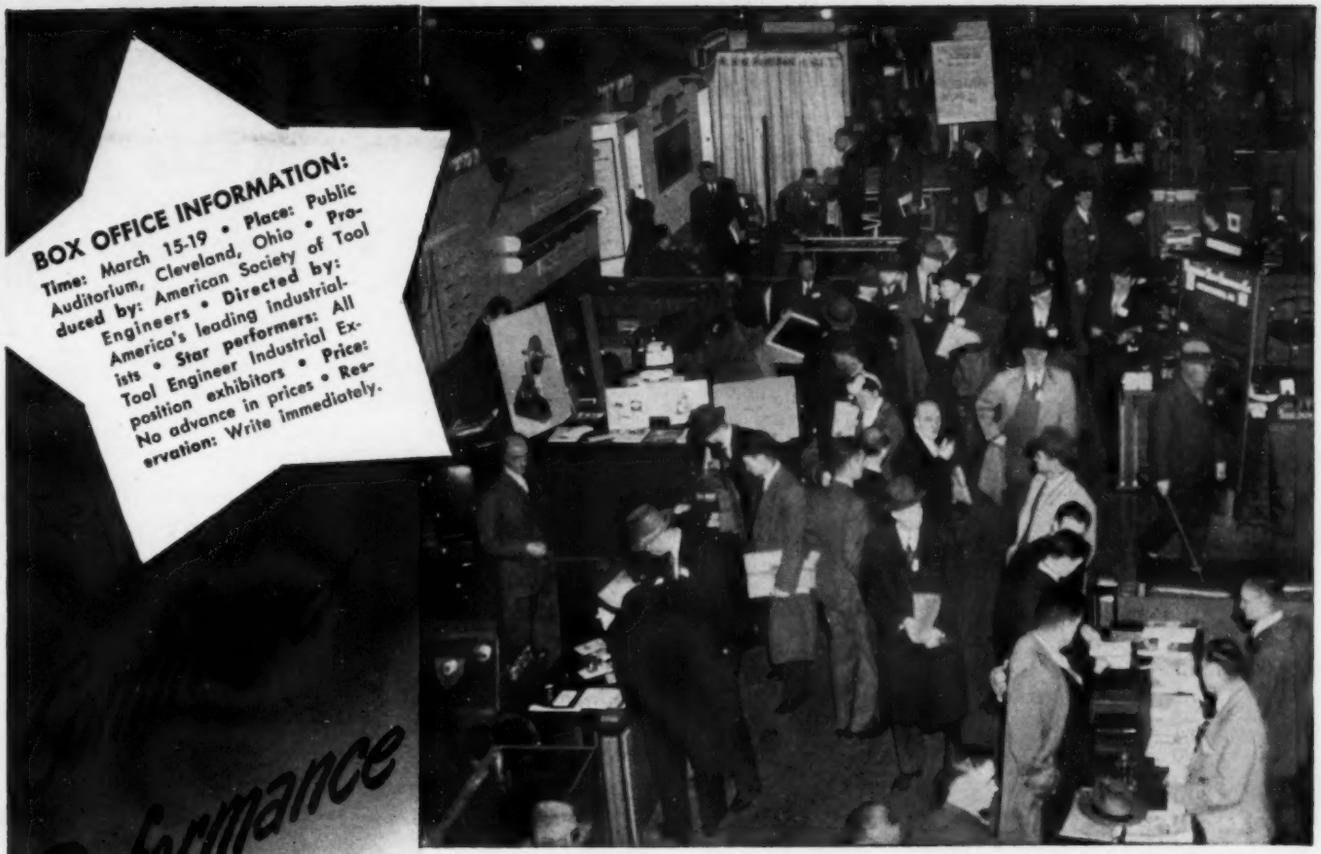

BOX OFFICE INFORMATION:
Time: March 15-19 • Place: Public Auditorium, Cleveland, Ohio • Produced by: American Society of Tool Engineers • Directed by: America's leading industrialists • Star performers: All Tool Engineer Industrial Exposition exhibitors • Price: No advance in prices • Reservation: Write immediately.
Performance

The "Standing Room Only" sign was out at the last Tool Engineers' Exposition. Get your reservation in early!

. . . that commands attendance!

The curtain's rising on ways and means to aid *tool engineers* and *industrial engineers* in their drive for greater production.

Just around the corner of the year the American Society of Tool Engineers will present in Cleveland, Ohio, the most spectacular Tool Engineers' Industrial Exposition ever held.

Production is on the march! The latest developments in tools, machines and industrial equipment for the world's vitally needed increased production will be presented at this Exposition. You cannot afford to miss this opportunity to participate and exhibit your contribution toward increased production efficiency to this vast and select audience of equipment buyers.

New and different products and methods, technical sessions, plant tours and industrial movies all add up to a more business-producing Tool Engineers' Industrial Exposition than ever before.

Fifth row center for a star-packed performance!

The men who dictate what shall be bought, and from whom, are the self-same men who attend the Tool Engineers' Industrial Exposition again and again.

Proof? Thousands of these "men who count" attended the last Exposition in 1946. And every one of them was connected directly with manufacturing, or was an industrial or tool engineer, hunting (and finding) better ways to do his job.

Extra Added Attraction:

Coincidental with the Exposition, ASTE members will meet for their 16th Annual Convention and technical sessions in Cleveland. It's your big chance to sell the tool engineer . . . so make it a date for '48!

• • •

For complete information write the

EXPOSITION COMMITTEE

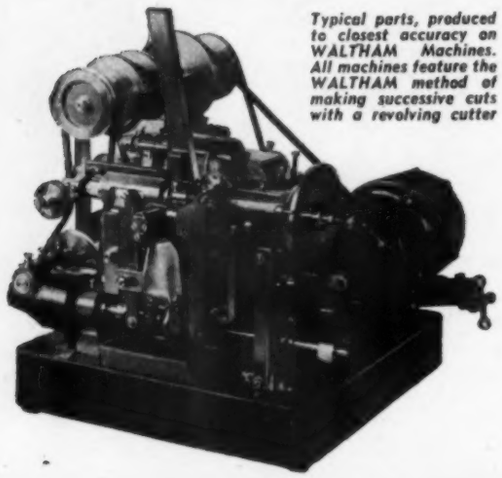
AMERICAN SOCIETY OF TOOL ENGINEERS

1666 PENOBSCOT BLDG.

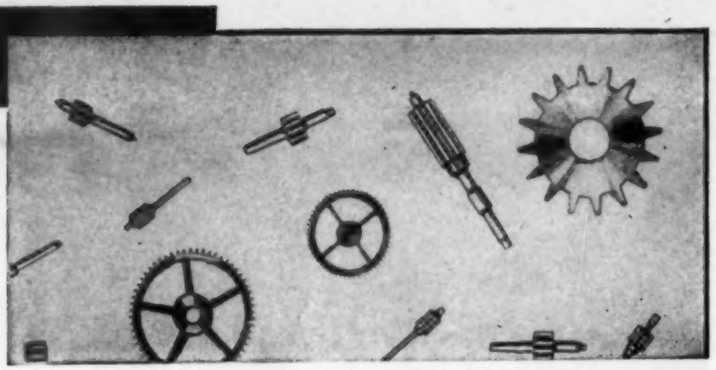
DETROIT 26, MICHIGAN

WALTHAM
PINION & GEAR CUTTING MACHINES

for precision production of fine pitch mechanisms



Typical parts, produced to closest accuracy on WALTHAM Machines. All machines feature the WALTHAM method of making successive cuts with a revolving cutter



Single-Cut Pinion Machines This machine employs one cutter. Blank is positioned and machine started by hand, all other movements being automatic.

Multiple-Cut Pinion Machines Two or three cutters on arbor of cutter spindle make successive cuts. Machine stops on completion of last cut.

Magazine-Fed Pinion Machines Provides continuous production of one kind of pinion. Magazine is loaded and all other operations including cutting and ejecting are automatic and continuous.

Gear Cutting Machines Single and Multiple cut machines equipped with special cutter swing provide the means of cutting teeth on gears up to 1½" pitch diameter and in a stack ¾" to 1" long.

Write for literature giving detailed specifications

WALTHAM MACHINE WORKS
WALTHAM, MASS.

WALTHAM TRADE MARK REGISTERED U.S. PAT. OFF.

The AIR-HYDRAULIC PRESS
2½ and 6 Ton Capacities

NO OTHER PRESS DOES SO MANY JOBS SO WELL!

ASSEMBLING — Laminations and rivets squeezed at one stroke. Steady controlled pressure prevents distortion.

CRIMPING—4 crimps made at one stroke with no damage to plastic base in assembly of radio tube.

ASSEMBLING— Worm pressed over knurled spindle on venetian blind hardware.

BROACHING — 8 slots broached at one stroke on plastic base. Broaching, slotting and piercing operations on plastics performed easily on A-H Press.

RIVETING — 3 tubular rivets in ceramic base "squeezed with speed" at one stroke. Eliminates danger of damage to ceramic.

FORMING — Field coil squeezed into concave shape from flat. Only a squeeze assures perfect, uniform work, free of tape breakage.

STAKING — Multiple staking operation on metal and bakelite radio volume control.

ASSEMBLING
BROACHING
RIVETING
STAKING
CRIMPING
TRIMMING
MARKING
SHAPING

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Factory: 120 W. Middle Street, Chelsea, Mich.

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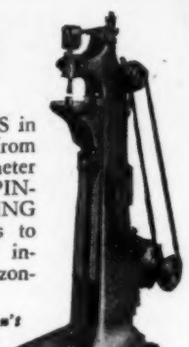
RIVETERS — PIONEERS in their line—head rivets from smallest to ⅝" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.



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ANTON PARALLELS

INCREASE PRODUCTION IMPROVE QUALITY USE ANTON PARALLELS ANTON PARALLELS FILL A LONG-FELT NEED—Permanently straight and accurate, yet priced for general machine shop use. All fully guaranteed to be within the limits specified. Maximum size tolerance .001 inch on ground sides. Maximum variation in parallelism and straightness within length, .0001. Rockwell "C" hardness 65 up.

Price per set includes a handy Wooden Container. Large Stock of Single Pairs also Available. All Prices are F.O.B. New York

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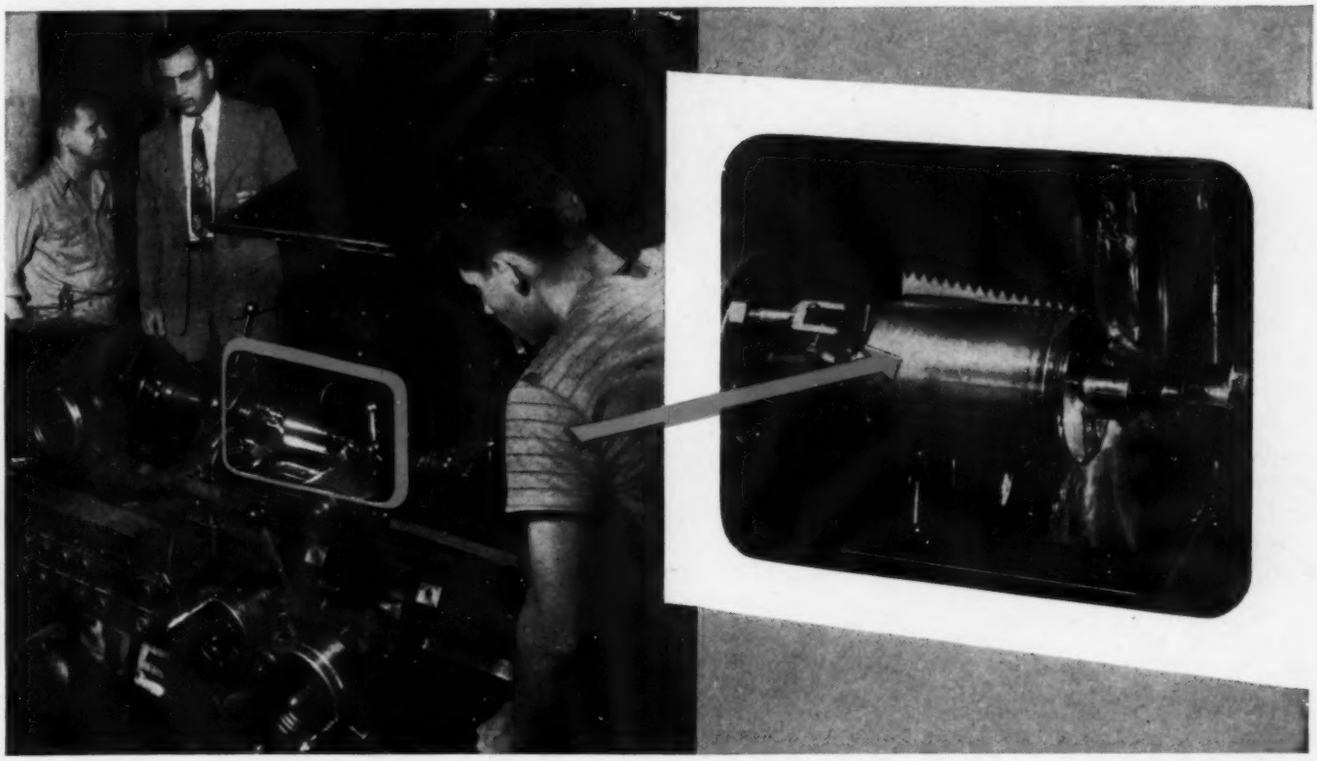
GULF THREAD GRINDING OIL

--and greater operator acceptance"

says the management of this modern shop



—"objectionable odor and skin irritations eliminated"

The Foreman (left) consults with a Gulf Lubrication Engineer on the performance of Gulf Thread Grinding Oil on special setup for grinding thread gauges. (Photos courtesy of Allen Gauge & Tool Company, Pittsburgh, Pa.)

"GULF THREAD GRINDING OIL is doing an outstanding job for us," says the management of this shop. "We're not only getting better threads, but also greater production and fewer rejects on our precision gauges."

"Just as important to us is the fact that our operators prefer Gulf Thread Grinding Oil. They like it because it has no objectionable odor, does not irritate the skin, and does not mist."

Specially developed by Gulf technologists for use on automatic thread grinding machines, Gulf Thread Grinding Oil combines the qualities you need to do a faster, more accurate thread grinding job. This quality product has superior lubricating and cooling qualities, gives effective protection against rust, has no objectionable odor, is nontoxic, and nonfoaming.

Call in a Gulf Lubrication Engineer today and ask him to demonstrate conclusively how Gulf Thread Grinding Oil can help you improve production and thread quality. Write, wire, or phone your nearest Gulf office.

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MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YO

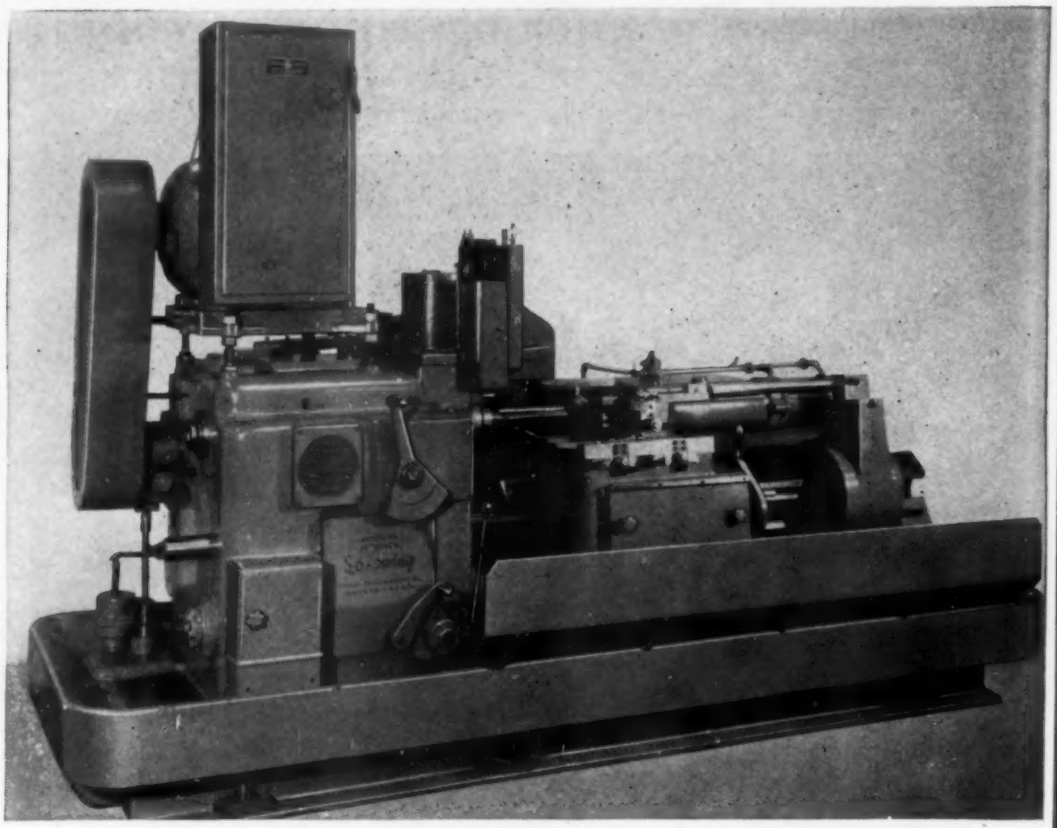


Illustration shows machine equipped with two-slide front carriage, back squaring attachment and third arm facing attachment.

MODEL AR *Lo-swing* LATHE FEATURES INSTANTANEOUS TOOL RELIEF CONTROL

● Foremost of the improved features and refinements which distinguish this newest Lo-swing Automatic Lathe is its instantaneous tool relief control mechanism which reduces tool breakage and down time. In case of breakage of any carbide tipped tool, the operator merely pushes a control lever which reverses rotation of the feed mechanism. Carriages and slides automatically return to starting position without disturbing timing of the slides or adjustment of the tools.

Model AR also is equipped with the Seneca Falls SIMPLIFIED CHANGE-OVER MECHANISM. All cams may be pre-set to graduated dials for desired length of cut—eliminating loss of time through the old cut and try method. Other features include a new type front carriage which facilitates loading and unloading of parts, and a new type pan which considerably increases chip capacity and simplifies chip removal.

In capacity, Model AR is between the Model LR and Model R-14 Lo-swing lathes. It incorporates all the proven advantages of positive cam operation and offers a flexibility never before obtained in a 100% mechanically-operated lathe. It is designed to take full advantage of the fast cutting speeds possible with carbide tools. Bulletin No. AR46 will be sent on request.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

KENT-OWENS BUILDS 'EM

RUGGED

TO KEEP YOUR PRODUCTION UP AND COSTS DOWN!

Maybe we're "sticking our neck out"—but we think your toughest milling problems can be handled *right* with Kent-Owens Machines!

On countless jobs—these Milling Machines have shown ability to turn out the work with top speed and high accuracy. They're outstandingly rugged . . . efficient . . . dependable. Designed with practical features that help you *produce more* . . . with *lower costs!*

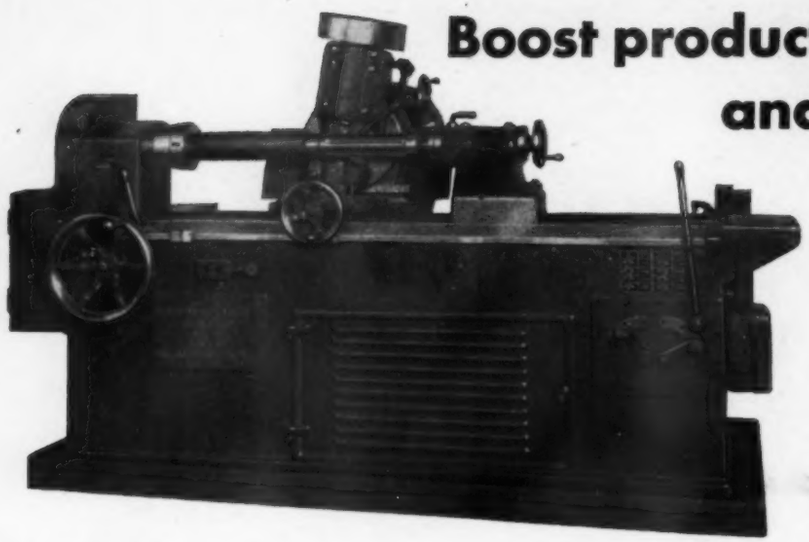
The Kent-Owens Standard line includes a wide range of hydraulic and hand operated machines. Let Kent-Owens engineers recommend machines and tooling best suited to your requirements. Write us about your needs. Kent-Owens Machine Company, Toledo, Ohio.

Call on

KENT-OWENS

for Milling Machines

Boost production on spur gears and multiple splined shafts with the ADAMS MANUFACTURING HOBBER!



Ask for Catalog No. 501 describing the Adams Manufacturing Hobber and the Adams Gear Hobber and Thread Miller.

Especially designed for high production hobbing on spur gears and multiple splined shafts, the Adams Manufacturing Hobber offers three outstanding features—extreme precision . . . great rigidity . . . unusually simple setups. Rugged construction throughout makes this a high production tool that will give long, dependable service. The Adams Manufacturing Hobber is made in two models to handle a wide range of requirements.

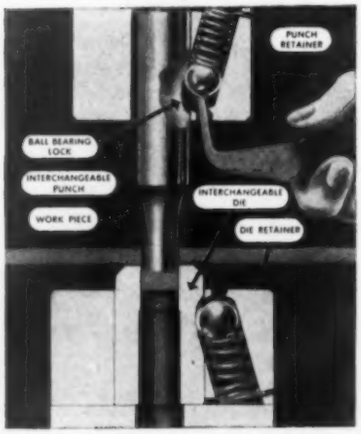
THE ADAMS COMPANY, 1905 Bridge St., Dubuque, Iowa

The ADAMS Company, Dubuque, Iowa, U.S.A.

HOBBER AND THREAD MILLER . . . MANUFACTURING HOBBER . . .

INTERCHANGEABLE PUNCHES and DIES Quickly Inserted . . . Rigidly Held!

Allied's R-B Interchangeable Punches and Dies are quickly inserted—rigidly held for accurate, trouble-free punching in the metal-working and plastics industries. They are available from stock in *standard* round, oblong and square shapes of almost any required size. Specials of any size, shape or material are promptly furnished to your specifications . . . and delivery dates are *dependable*.



Large, illustrated R-B Catalog gives complete details, specifications. Write for it.

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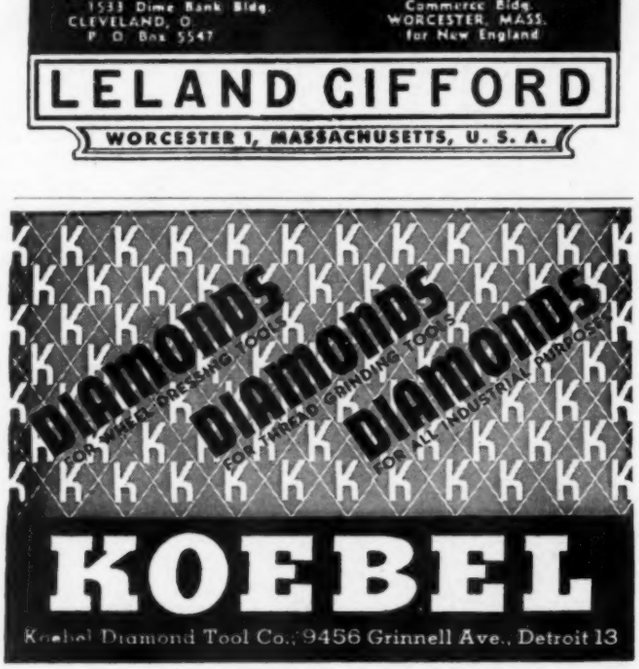
DIAMONDS FOR WHEEL DRESSING TOOLS
DIAMONDS FOR THREAD GRINDING TOOLS
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Koebel Diamond Tool Co., 9456 Grinnell Ave., Detroit 13

Complete New BENCH GRINDER Line Does BETTER, FASTER Work

in Tool Sharpening, Grinding, Wire Brushing

Now, Black & Decker gives you everything you want in modern bench grinding equipment . . . *all in one complete line!* Three popular size Bench Grinders speed up tool sharpening, heavy-duty grinding, wire brushing, buffing, etc. New accessories make them even more efficient!

Job-proven features like: 1. Modern, streamlined design improves working clearances, reduces weight. 2. Dependable B&D-built "constant speed"motors maintain correct operating speed. 3. U-shaped tool rests improve tool sharpening support; adjustable on strong steel wheel guards. 4. Perforated tool rests and exhaust outlets, connectible to dust collector, keep working area free of abrasive dust . . . on 8″ and 10″ Grinders only.

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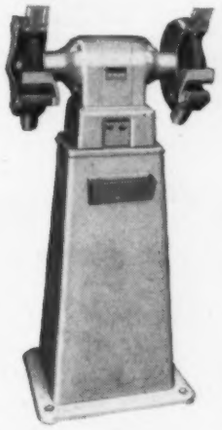
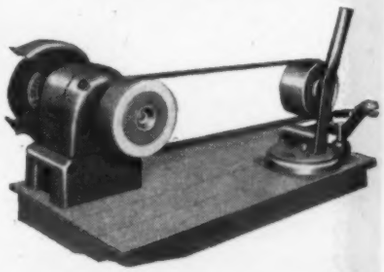
"WHIRLWIND" WIRE WHEEL BRUSHES, designed and built right in our plant, give longer life, better brushing surface.



STREAMLINED PEDESTALS permit spotting these grinders anywhere in the shop at convenient working height.



BACK-STAND IDLER utilizes abrasive belt grinding for more abrasive surface, maximum grinding speed at all times, faster work at lower cost.

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RED—NOT GO

Industry by industry—coast to coast—wherever accuracy and durability count—Woodworth Company is winning and holding new friends—with the *ACCEPTED ADJUSTABLE THREAD RING GAGE.*

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SEND FOR—The new 1948 Woodworth Gage Catalog just off the presses. Requests for copies must be written on company letterheads.

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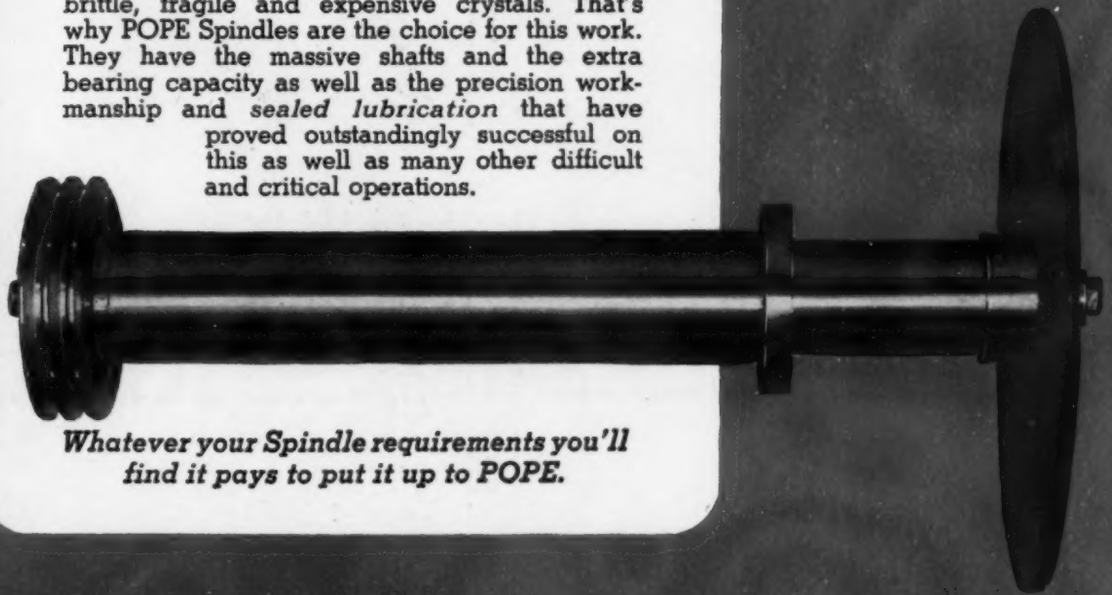
Ever Cut Quartz?

POPE PRECISION *Sealed Lubrication* **SPINDLES** *Have What It Takes to Cut PIEZO Crystals*—**And That Means They're the Best Spindles for** *Your* **Cutting or Grinding Job, Too**

Cutting quartz crystals into the right shapes for Piezo-electric Oscillators, Piezo-electric Resonators, Wireless Telephone Detectors and the like is a job that calls for a skilled operator, a diamond cutting wheel, *and a POPE Spindle.*

Any radial or axial yield in the Spindle might mean fracture or destruction of the super-hard, brittle, fragile and expensive crystals. That's why POPE Spindles are the choice for this work. They have the massive shafts and the extra bearing capacity as well as the precision workmanship and *sealed lubrication* that have proved outstandingly successful on this as well as many other difficult and critical operations.



Whatever your Spindle requirements you'll find it pays to put it up to POPE.

No. 47

POPE

TRADE MARK REG. U.S. PAT. OFF.

POPE MACHINERY CORPORATION

ESTABLISHED 1920

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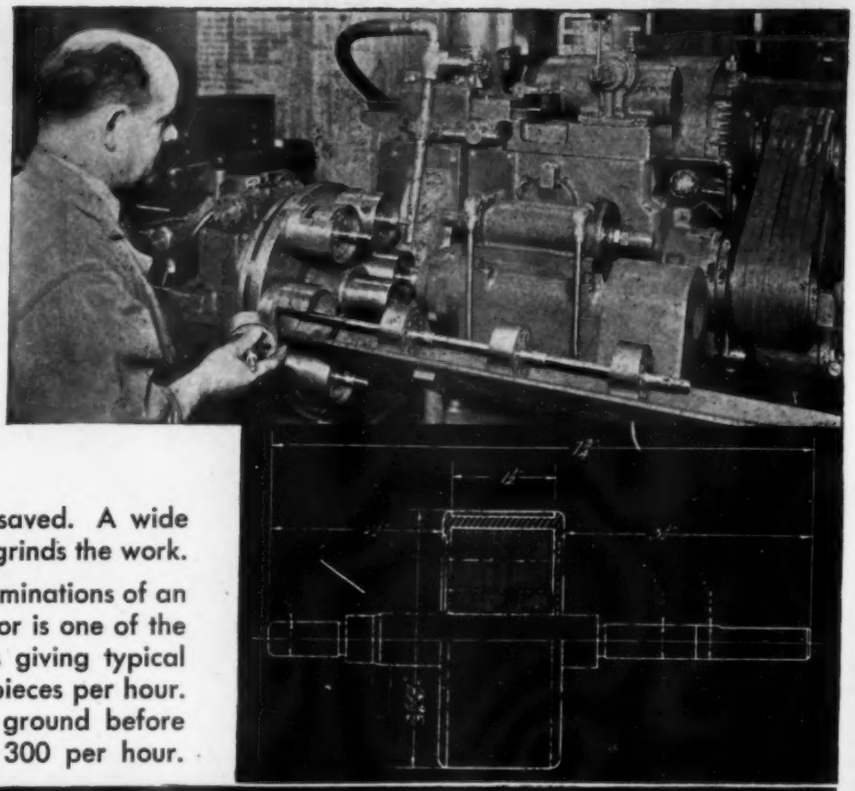
BUILDERS OF PRECISION SPINDLES

Cylindrical Grinding Automatically

High productive rate by ARTER No. 135



A drum or carrier, hand loaded, brings the work between two live work spindles. Either work centers or collets pick up and drive the work. Dogging and handling time saved. A wide wheel, oscillating slightly, plunge-cut grinds the work.

The grinding of the diameter of the laminations of an armature for a washing machine motor is one of the many jobs on which this machine is giving typical ARTER satisfaction. Production—200 pieces per hour. The central taper shaft diameter is ground before assembly with a production rate of 300 per hour.

ARTER GRINDING MACHINE COMPANY

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KEYSEATING

The Modern Way

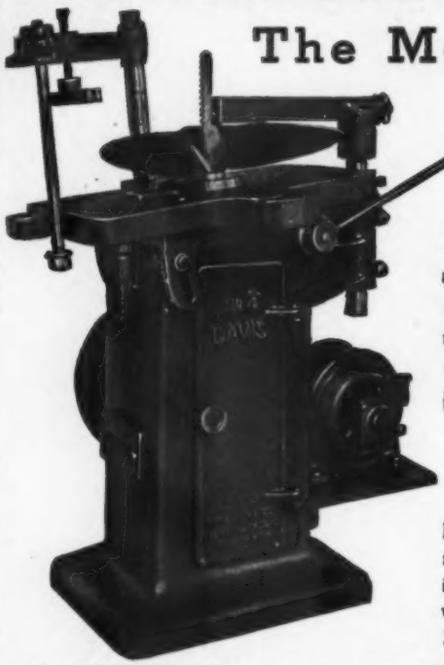

Illustration shows typical set-up for cutting taper keyway with table tilted.

Machines are made in three sizes for keyways 1/16" to 1¼" in width.

Great simplicity and ease of operation of Davis Keyseaters assure the user of accurate, time saving work.

Let our engineer study your keyseating problems.

DAVIS KEYSEATER COMPANY

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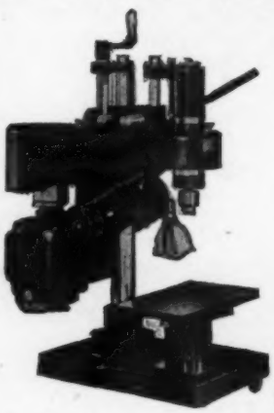

Hamilton Varimatic Super-Sensitive Drilling Machine

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SMALL, ACCURATE PRODUCTION DRILLING

AT LESS COST PER HOLE

Hamilton Small Hole, Super-Sensitive Drills have many exclusive, patented features. Your small holes, .004" to 5/16", can be produced by these machines accurately and rapidly . . . and at less cost per hole.

Especially adapted to watch and clock manufacture and to the manufacture of instruments, business machines and other items where finest work must be performed on fast production schedules. These machines have stood the test of time. 80% of present installations are repeat orders.

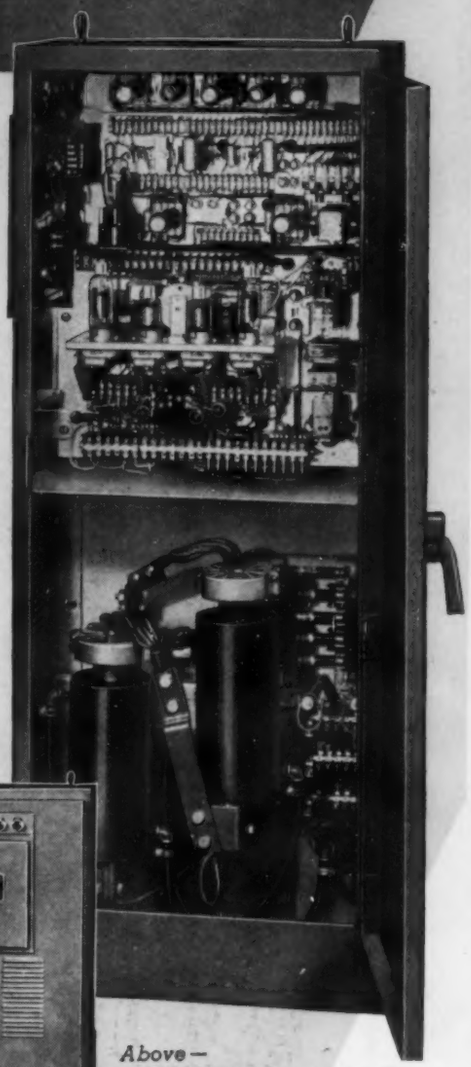
Machines of various clearances, capacities and travel to fit your specific requirements. Write for bulletin.

THE Hamilton TOOL COMPANY

930 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

NOW *Electronic* WELDER CONTROL designed to INDUSTRIAL STANDARDS

***NEW** Square D Class 8993 combination controllers **for resistance welders** incorporate, in one enclosure, electronic contactor, heat control, synchronous-precision weld timer, and sequence panel. They provide accurate time and current measure recommended for welding non-ferrous metals, stainless steels, small parts and other critical jobs.*



IMPORTANT NEW CONSTRUCTION FEATURES

- All terminal connections and tie points are made accessible by opening main door and swinging out weld time panel.
- Simple tools—screw-driver and pliers—can be used to replace components. Number of soldered connections is minimized.
- Functional sub-panels (contactor, heat control, timing, and sequencing) have separable connectors—may be quickly removed or replaced.
- Designed for mounting on side of machine or for wall mounting.

IMPORTANT NEW CIRCUIT FEATURES

- New separate excitation circuit for ignitrons makes firing independent of voltage or load current. Firing pulses have consistent amplitude and duration for all heat control settings from 20% to 100% current.
- Synchronous-precision weld timing circuit operates on new differential discharge principle. Voltage changes before or during the weld have no effect on timing accuracy.
- All-electronic circuit has no sequencing relays and is of simplified design. For maximum safety, air valve is energized by a magnetic contactor. A no-weld relay disconnects firing tube anodes only in response to no-weld and water-flow switches, and warm-up timer.
- Coupling transformers isolate functional sections of circuit for maximum safety and efficiency. Initiating, no-weld, and pressure switch circuits are 110 volts.

Above—
All circuit terminals and tie points accessible by opening main door and swinging out sequence panel.

Left—
Controller can be arranged either for side of machine mounting or wall mounting.

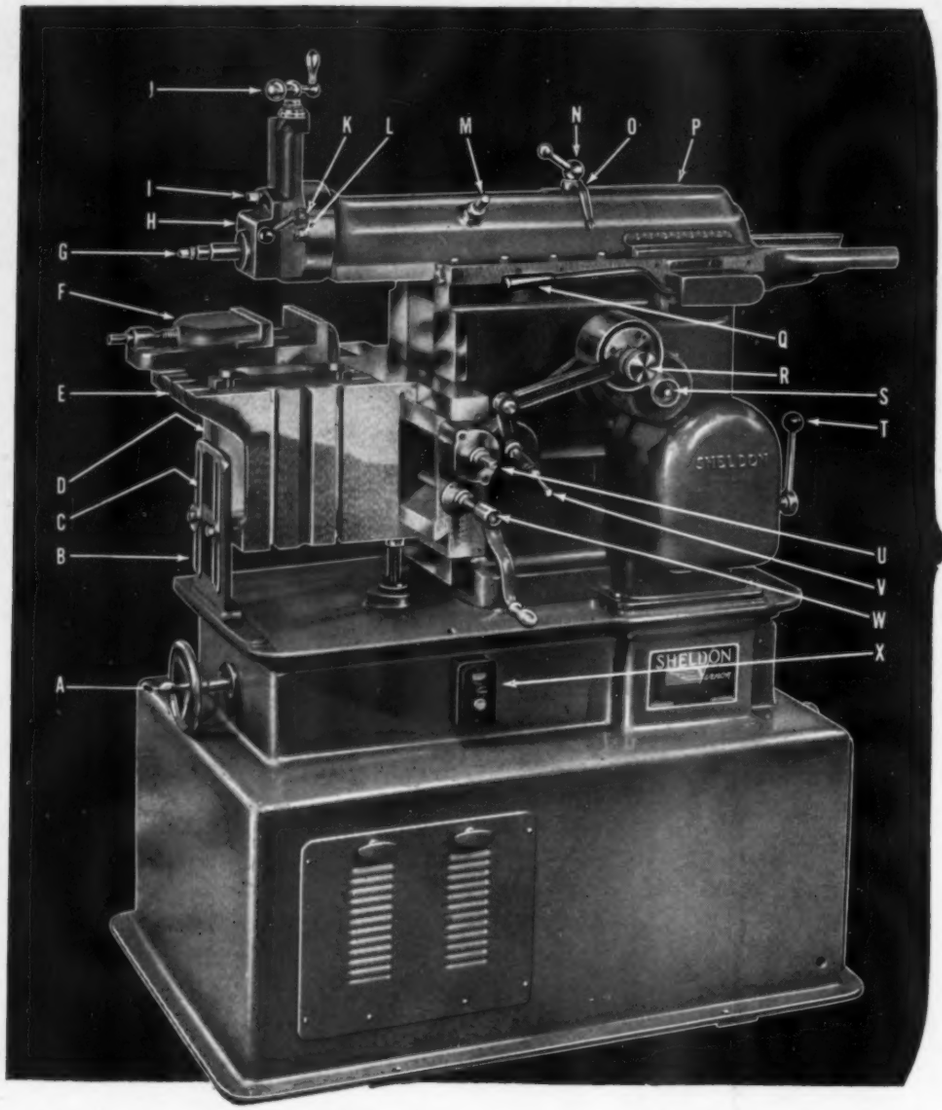
***Write** for Bulletin 208 • Square D Company • 4041 N. Richards St. • Milwaukee 12, Wisconsin*

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D CANADA, LTD., TORONTO, ONTARIO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

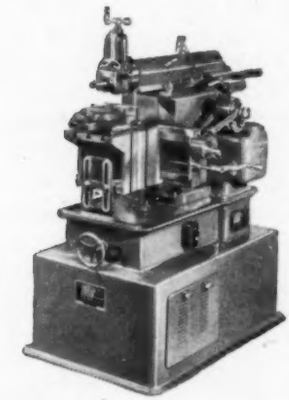
SHELDON



A—Variable Speed Hand Wheel
B—Table Support
C—Table Protractor (Not Shown)
D—Cross Rail Lock
E—Table
F—Vise
G—Tool Holder
H—Clapper Box
I—Clapper Box Lock
J—Tool Slide Handle
K—Tool Slide Lock
L—Tool Slide Swivel Lock
M—Ram Positioner
N—Ram Clamp
O—Stroke Indicator
P—Ram
Q—Clutch
R—Feed Adjustment
S—Shaft for Adjusting Length of Stroke
T—Back Gear Lever
U—Cross Feed Screw
V—Feed Direction Control
W—Elevating Shaft
X—Motor Switch

SHELDON *Vernon*

No. 8000 12" SHAPER



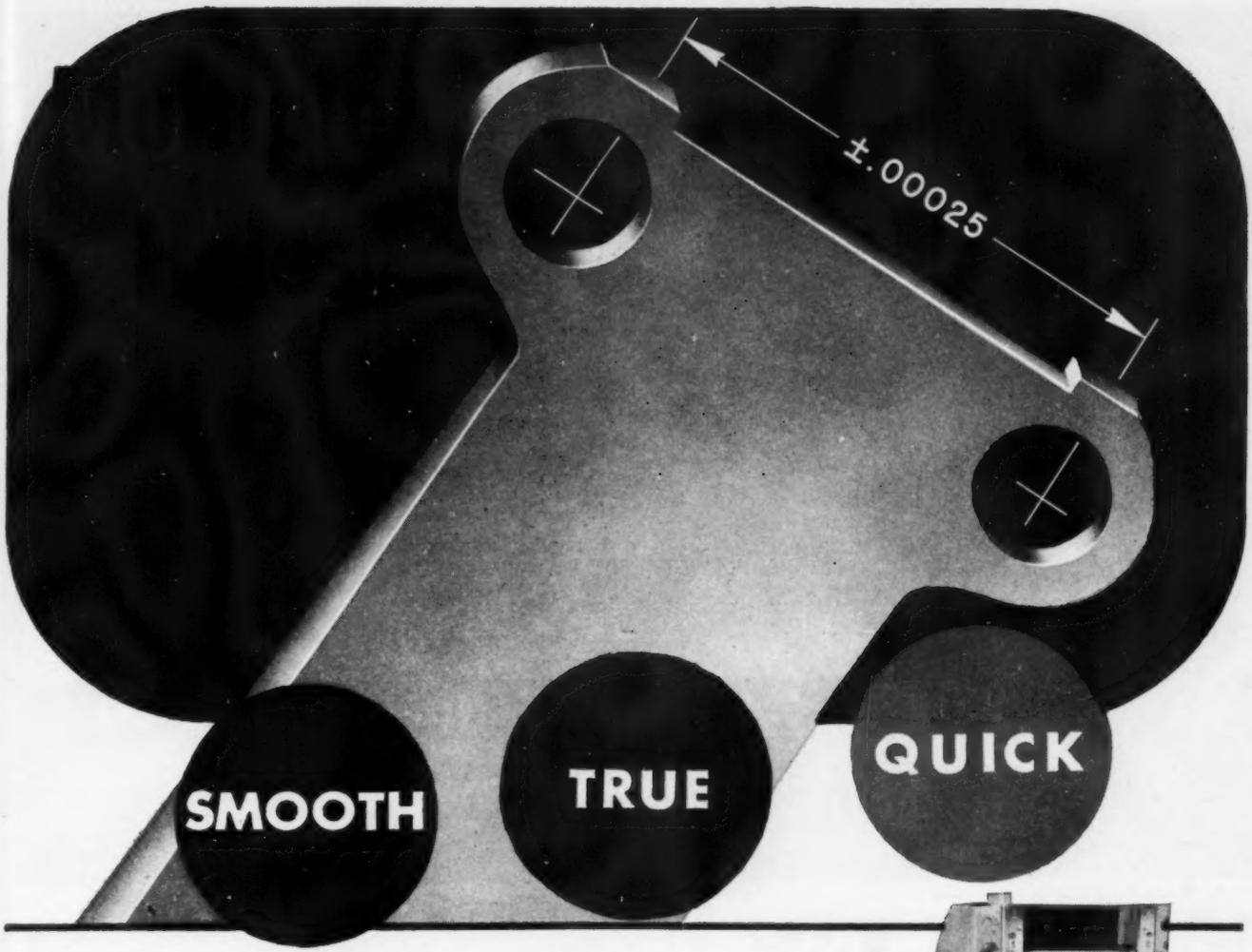
Engineered to meet today's demand for close tolerance work at a wide range of speeds . . . for a compact, easy to operate shaper that is sturdy enough for production use, still accurate enough for the tool room . . . for a capable full sized (1800 lb.) shaper at a low price. Here is a modern quality shaper you should know about.

Write for Bulletin 547B.

SHELDON MACHINE CO. Inc.

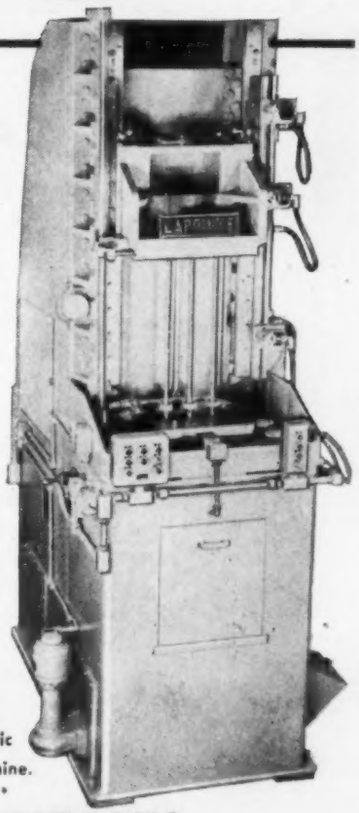
Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers

4234 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U. S. A.



Are you cutting multiple holes and want to hold their center distance to within .00025? Try Broaching. Yes, with a standard hydraulic pull down broaching machine, one company outproduced previous methods in assembly plate construction 19 to 1, and with a new, semi-automatic work holding fixture, has added another 48% to production results. Heavier construction and positive broach guide maintains vertical accuracy throughout entire stroke. This accounts for the superiority of the standard Lapointe V-3 Machine in this type of operation.

It is this unfailing ability of Lapointe engineers to further the cause of accurate production that has made them the leaders in this superior method of metal removing. If your manufacturing problem concerns mass production—precision production—consult Lapointe today. Write for Booklet No. 43.



Lapointe Model V-3 special 20 ton 42" stroke Vertical Hydraulic Pull Down Broaching Machine.

HUDSON LAPOINTE MASS.

THE Lapointe MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory • Edgware • Middlesex • England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

CARD TAPS

ARE YOU INTERESTED IN BETTER TAPPING?

If better production tapping is your objective, it will be to your advantage to come to Card, We can help you because we sell better tapping performance.

The high quality of work done—the quantity produced—the economy of using Card Taps—will be apparent on any tapping job. Just put Card Taps to work and let them prove their superiority.

A regular catalog tap in most cases will meet your needs without using special taps. You'll find your requirements covered in the Card Catalog No. 34. Write for a copy.

Card Taps are sold by leading dealers everywhere

S. W. CARD MANUFACTURING CO.
Mansfield, Mass., U. S. A.
DIVISION OF UNION TWIST DRILL CO.

STORES: New York: 61 Reade St., Chicago: 11 South Clinton St. Detroit: 5527 Woodward Ave., Seattle: 568 First Avenue, South Los Angeles: 168 South Central Avenue San Francisco: 121 Second St.

LINLEY

for NOISELESS, HIGH SPEED RIVETING

Rotary spinning principle shapes uniform heads, silently . . . capacities up to ⅜ inch diameters. Adjustable spindle stroke, controlled pressure . . . double row radial thrust bearing supports spindle, assures long life. Table elevating screw prevents slipping. Six floor or space-saving bench models . . . sturdily built for trouble-free operation under severe production schedules.

FOR COMPLETE INFORMATION, WRITE FOR BULLETIN.

LINLEY BROTHERS CO., 664 STATE ST. EXTENSION BRIDGEPORT 1, CONNECTICUT

You can do any of these jobs FASTER-EASIER-BETTER with Strand Flexible Shaft Machines

Grinding • buffing • polishing • sanding • drilling reaming • rotary filing wire brushing • screw driving • nut setting • wood filer rubbing • rasping

M-5

Strand machines provide PORTABLE rotary power at CONSTANT speeds with dependable results and less operator fatigue. Ruggedly built for years of steady use. Hundreds of attachments easily interchanged—125 types and sizes—vertical and horizontal models from ⅛ to 3 H.P.

Distributors in all Principal Cities

Send for CATALOG showing complete line.

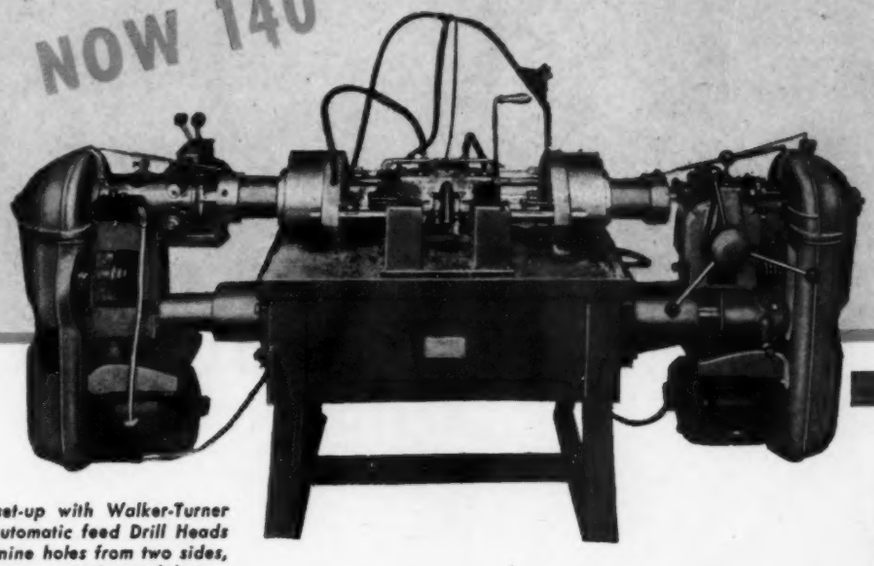
Booth No. 2323 National Metal Show

Strand FLEXIBLE SHAFTS

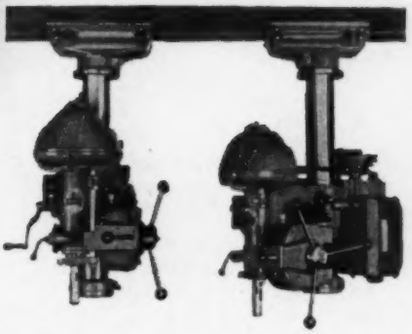
N. A. STRAND & CO.
5009 NO. WOLCOTT AVE.
CHICAGO 40, ILL.

~~25~~ PIECES PER HOUR
NOW 140

20" POWER FEED WALKER-TURNER Drill Heads



This set-up with Walker-Turner 20" automatic feed Drill Heads drills nine holes from two sides, in one automatic push-button cycle.



Two Walker-Turner standard 20" Power Feed Drill Heads mounted on a sliding carriage supported by an "I" beam. Heads move radially and swing horizontally through a complete circle.

The Du-Fold Mop Manufacturing Company of Cleveland recently increased the production of metal mop heads by nearly 500% by using two Walker-Turner Drill Presses in a special set-up with Zagar gearless drill heads.

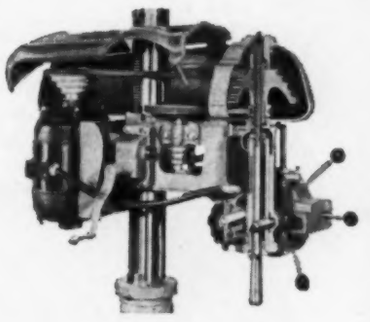
One head drills five and the other four holes—at opposite ends. The work locates automatically. A push button starts the complete cycle including retraction of heads.

"VERY DIFFICULT PROBLEM SOLVED," *says DuFold*

"It has really solved a very difficult drilling problem for us and we will be placing another order shortly," is the comment on this Walker-Turner job.

We used your 20" power feed drill presses in the manufacture of 40 mm. tracer shots during the war and we were so well satisfied with them that we did not consider any other make.

The wide range of speeds and the 10 spline spindle with no play and low investment cost are other reasons why Walker-Turner drill presses were chosen for this set up.



20" Power Feed Drill Press Head. Five standard spindle speeds, 400 to 2600 r.p.m. with 1740 r.p.m. motor. Capacity 1" in cast iron, 3/4" steel.

Price less motor **$216.00**

TWENTY-FIFTH YEAR
1922 1947

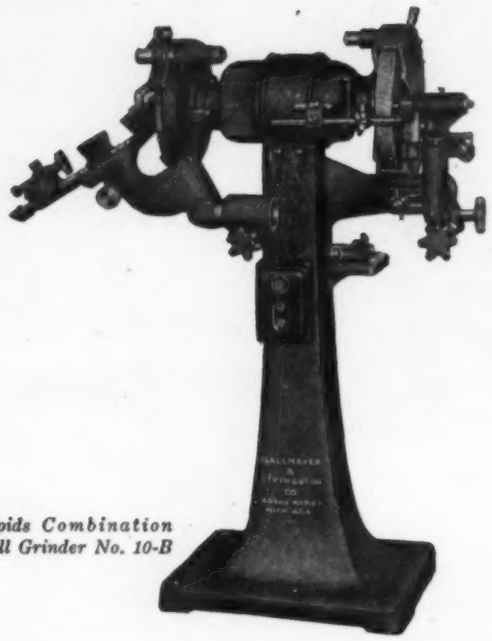
SOLD ONLY BY AUTHORIZED INDUSTRIAL MACHINERY DISTRIBUTORS 165

walker-turner COMPANY, Inc. PLAINFIELD, N.J. U.S.A.

MACHINE TOOLS

DRILL PRESSES—HAND AND POWER FEED • RADIAL DRILLS • RADIAL SAWS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

GRAND RAPIDS GRINDING MACHINES



Grand Rapids Combination Tap & Drill Grinder No. 10-B

DELIVER TOP TOOL ROOM EFFICIENCY

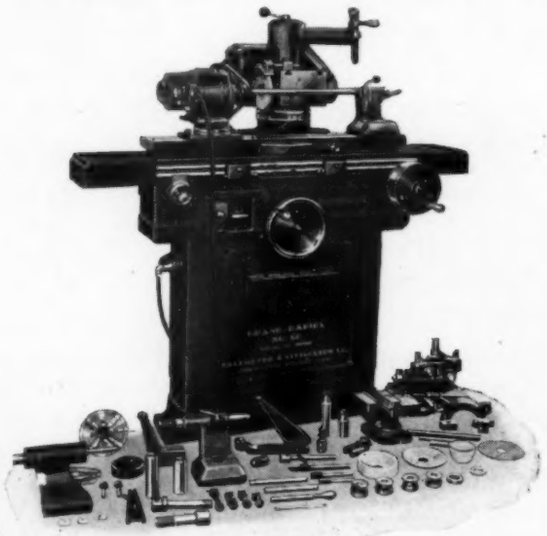
Whether you need a Universal Cutter and Tool Grinder or a Combination Tap and Drill Grinder, you can be sure of top tool room efficiency if they bear the name "Grand Rapids," manufactured by Gallmeyer & Livingston Co.

With the Combination Tap and Drill Grinder you save three ways: 1. On first cost, 2. Through lower maintenance expense, 3. On valuable floor space.

With Grand Rapids No. 60 Universal Cutter and Tool Grinder you can handle complex tool grinding jobs with maximum speed and convenience.

Write for descriptive bulletins

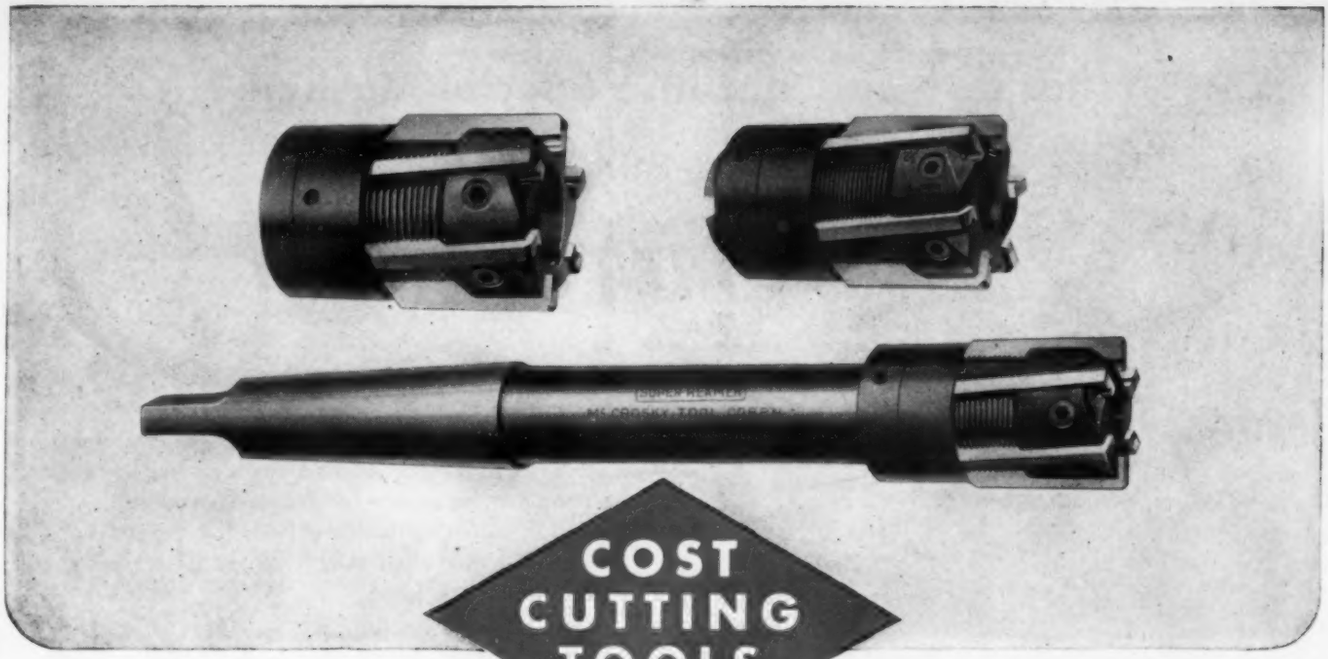
GL 8-46 describes the No. 10-B
2-28-46 describes the No. 60



Grand Rapids No. 60 Universal Cutter and Tool Grinder

What "GRAND RAPIDS" Quality Means: Gallmeyer & Livingston cast their close-grained gray iron, machine to micrometric tolerances, precision-assemble grinding machinery of unsurpassed performance. *Grand Rapids* means *top* quality in grinding machinery.

GALLMEYER & LIVINGSTON COMPANY, 330 STRAIGHT ST., S. W., GRAND RAPIDS 4, MICH.



COST CUTTING TOOLS

McCROSKY *Super Adjustable* REAMERS

for more production more accurately at lower cost

McCROSKY Super Adjustable Reamers cut freely without chatter. They avoid any tendency to "dig in", produce absolutely round, concentric holes, —and meet every requirement of the higher operating feeds and speeds now being employed in most shops.

These reamers combine the strength and rigidity of solid blade reamers and the greater accuracy and lower operating costs of replaceable blade reamers. The isothermal quench and draw of the alloy steel bodies and the special heat treatment of the blades assures unsurpassed performance, efficiency and accuracy. McCrosky reamers and blades will produce more pieces—better—in shorter time. Furnished in machine chucking and shell designs, with high speed cast alloy or carbide tipped blades. Send for Bulletin R-17, it gives full details.

McCROSKY TOOL CORPORATION
MEADVILLE, PA.

COST CUTTING TOOLS

Designers and Manufacturers of

Jack-Lock Milling Cutters — *Super Adjustable* Reamers
Block Type Boring Bars — *Turret* Tool Posts
Wizard Quick-Change Chucks — *Special* Multiple Operation Tools

What do you want in a Special Machine?

CRT will "Custom-Build" it . . .

. . . Start to Finish

High precision standards are an integral part of the fully-equipped, **CRT** plant.

● Solve your production problems with the *right* machine! **CRT** Production Analysts offer you an expert engineering service for design development and precision machine building from the ground up. Modern 100-man plant complemented by a wholly-owned foundry division.

Write, wire or phone Diamond 7300 for prompt action on all inquiries.

Cleveland Republic Tool

AND GAGE CORPORATION

9615 Meech Avenue • • • • • Cleveland 5, Ohio

The TYPE "A" PRODUCTION *High Speed — Centerless Feed* POLISHING MACHINE *No Centering or Chucking Work Fed Automatically.*

The Type "A" is a high speed, centerless feed unit for polishing and finishing metals, fibre, wood, rubber. A power feed attachment makes it possible to feed cylindrical work in long or short lengths automatically. With Taper Feed Attachment, tapered cylindrical work can be handled continuously.

An outstanding feature of this machine is the use of a two-belt system which provides for chip disposal immediately, resulting in finer finish work. Capacity with power feed attachment, is ¼" to 6" diameter round stock.

Write for illustrated literature

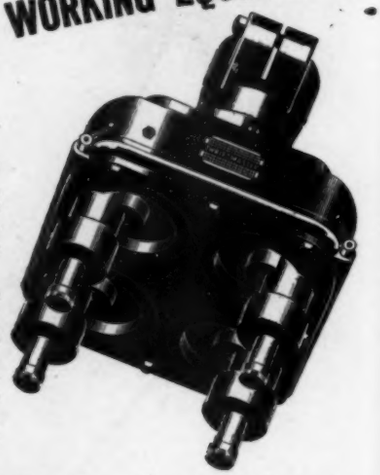
Specifications

Speed Leather Cushion Belt—6300 Ft. per min.
Floor Space—40"x50".
Height—89".
H.P.—10

Production MACHINE COMPANY GREENFIELD, MASSACHUSETTS, U.S.A.

Roastin' Ears too, demand it...

PROPER WORKING EQUIPMENT



WHILE only nature can help the little miss, Thriftmaster Multiple Spindle Drillheads are designed to accelerate your production.

Standard adjustable heads are made with 2, 3 or 4 spindles. Three- and four-spindle types, as illustrated, drill in a circular pattern. Three-spindle heads are also furnished for drilling equidistant on a straight line.

In all Thriftmaster Drillheads, power is transmitted from a fixed-center drive directly to the drill spindles by means of heavy, immersion-lubricated gears. All gears and rotating parts are of alloy-hardened, heat-treated steel for proper strength and wear characteristics and are ball bearing mounted to insure long life at maximum operating capacity. For information or recommendations write to: ENGINEERING DEPARTMENT, THRIFTMASTER PRODUCTS CORP., 1048 N. PLUM ST., LANCASTER, PA.

THRIFTMASTER *Multiple Spindle Drillheads*

STANDARD ENGINEERS NOTEBOOK

CALOL RPM

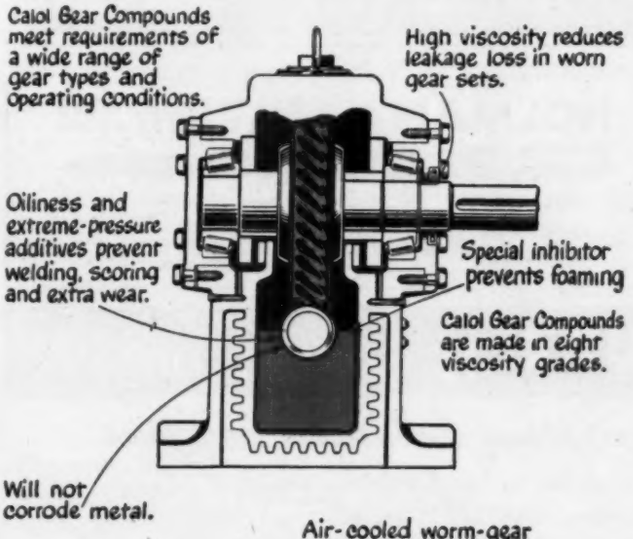
Compounded gear lube prevents excessive wear

Where a relatively heavy lubricant is required in industrial enclosed gears, a Calol Gear Compound is recommended. There are several viscosity grades to meet all conditions—Numbers 60, 100, 120, 135, 150, 190, 225 and 410.

Calol Gear Compounds contain oiliness and extreme-pressure additives which prevent welding, scoring and excessive wear of gears operating in hard service, and contain a special inhibitor which eliminates foaming.

They are non-corrosive, retain good body in all working temperatures and minimize leakage from worn gear sets. In worn gears, they also reduce vibration and noise by keeping a cushion-like film in large clearances between the teeth.

Calol Gear Compounds are adaptable to and provide economical lubrication in many types of gear sets and in a wide range of operating conditions.


Calol Gear Compounds meet requirements of a wide range of gear types and operating conditions.
High viscosity reduces leakage loss in worn gear sets.
Oiliness and extreme-pressure additives prevent welding, scoring and extra wear.
Special inhibitor prevents foaming
Calol Gear Compounds are made in eight viscosity grades.
Will not corrode metal.

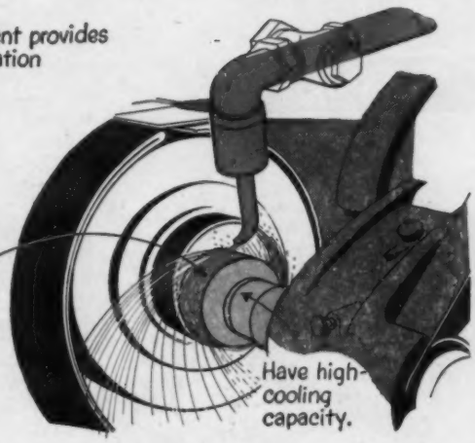
Air-cooled worm-gear Speed reducer.

Trademarks, "Calol," "RPM," Reg. U. S. Pat. Off.

Calol Soluble Oils with water form stable emulsions.

Contain defoaming agent and high phenol coefficient disinfectant.

Special ingredient provides rapid emulsification even with hard water.



Wheel-Grinding Machine.

Calol Soluble Oils form stable emulsions

Where metal cutting requires soluble oils machinists find Calol Soluble Oils form emulsions which speed production and promote finer finishes.

These oils are made of highly-refined base oils and a balanced combination of oil-soluble emulsifier and water-soluble wetting agent. A special ingredient speeds emulsification. This assures easy mixing and stable emulsions even with hard water.

All Calol Soluble Oils also contain a defoaming agent and a powerful disinfectant.

There are three types: Calol Soluble Oil which has all the ingredients and qualities mentioned above. Calol Soluble Oil —E.P. which contains additional ingredients that give it extreme pressure properties. Calol Soluble Oil —H.V. which is similar to Calol Soluble Oil except that its viscosity is considerably higher. Used in tube bending and aluminum forming and spinning operations, it is easily removed from finished parts by water.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Colo.; Standard Oil Company of Texas, El Paso, Texas.

FOR EVERY NEED A STANDARD OF CALIFORNIA JOB-PROVED PRODUCT

from FLAT SURFACES to INTRICATE SHAPES with the New DI-ACRO BRAKE

- ROK-LOK—sensitive material clamp increases accuracy
- DOUBLE-EDGED FORMING BLADE for close reverse bends
- NEW PRECISION STOPS control angularity of bends

This versatile metal forming machine was developed for use in model shops, experimental laboratories and production departments where it often replaces dies for all types of precision forming operations. Di-Acro Brakes will form a great variety of materials including bronze, stainless steel, aluminum and bi-metals.

WRITE FOR CATALOG New edition of 40-page Di-Acro Catalog contains detailed information on all Di-Acro Brakes, Shears, and Benders and illustrates how these precision machines can be used individually or cooperatively for "DIE-LESS DUPLICATING.

◀ DI-ACRO is Pronounced "Die-Ack-Ro"

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.

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PROVE THEM ON YOUR TOUGHEST OPERATIONS *at our* *Expense*

Solve **PRECISION LAPPING PROBLEMS**

With this trial carton your own experience will tell you why these finer quality, finer grit compounds are *right* for all precision lapping. Carton contains six grades of compounds, all fine grit sizes best suited to a variety of work. Mailed postpaid anywhere in U.S.A. No obligation. Write today.

UNITED STATES PRODUCTS CO.

518 MELWOOD ST. PITTSBURGH, PA

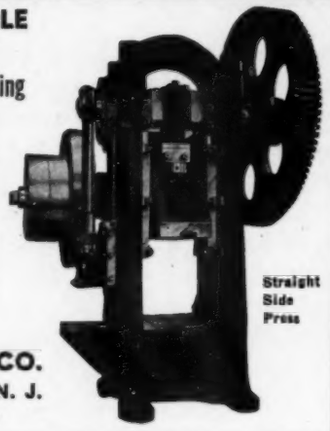
STRAIGHT SIDE SINGLE CRANK PRESSES

for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economicaly on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

Full details on request.



Straight Side Press

ZEH & HAHNEMANN CO.

NEWARK N. J.

180 Vanderpool Street

LUERS

Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured By

J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.

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HOLMAN

BETTER, FASTER HOLE FINISHING

HELICAL TAPER PIN REAMERS

Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

HOLMAN REAMER CO.

MANCHESTER, CONN.

NO BLOWER or POWER NECESSARY

. . . Just Connect to Gas Supply

BUZZER Gas BURNERS

Reg U.S. Pat. Off.

For Many Industrial Gas Uses

Designed to solve numerous Industrial Gas applications, "BUZZER" Burners are unexcelled for Efficiency, Economy, Simplicity and Flexibility. Large variety of models available.

Send for the "BUZZER" Catalog showing complete line of Industrial Gas Burners, Furnaces and other equipment.

CHARLES A. HONES, INC.

121 South Grand Avenue, Baldwin, L. I., N. Y.

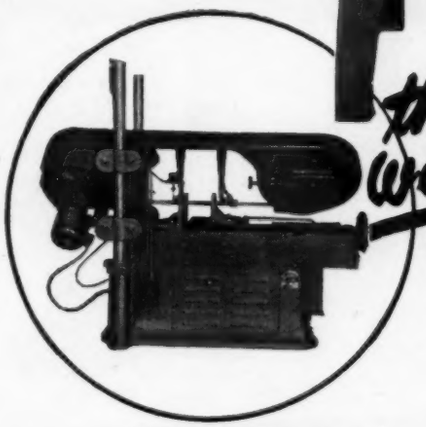
there is

no Lost Time

when you cut with a

WELLS METAL CUTTING BAND SAW

Illustrated is the Wells No. 8 with wet cutting system



the new Wells no 12

The revolutionary new Wells No. 12 features an automatic hydraulically controlled cutting cycle and controlled blade pressure. It will handle rectangular shapes up to 12" x 16" and rounds to 12¼" O.D. It operates at selective speeds of 60, 90 and 150 feet per minute.

You'll get the job done faster with a Wells Band Saw because the cutting action is continuous. There is no wasted motion. Service records in hundreds of leading plants prove that Well Saws reduce cutting time, yet they are versatile and economical. Ask your dealer for a demonstration or write direct.

Specifications—Wells No. 8

CAPACITY:	
Rectangular	8" x 16"
Special Guides	5" x 24"
Rounds	8" O. D.
MOTOR	½ H.P., A.C. or D.C.
SPEEDS	Selective; 60, 90, 130 feet per minute
WEIGHT	Approximately 665 pounds

Wells SAWS

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
505 ROOSEVELT RD., THREE RIVERS, MICH.

★ 4 BIG REASONS WHY

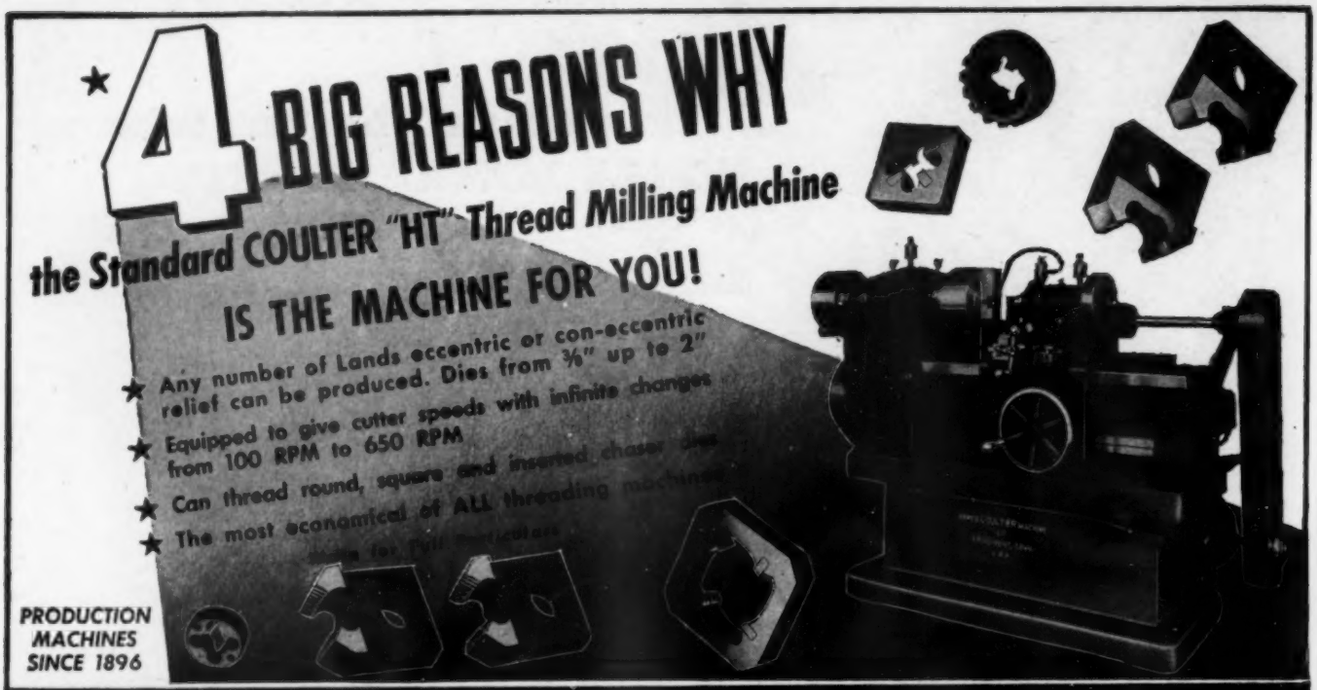
the Standard COULTER "HT" Thread Milling Machine IS THE MACHINE FOR YOU!

★ Any number of Lands eccentric or con-eccentric relief can be produced. Dies from ⅜" up to 2"

★ Equipped to give cutter speeds with infinite changes from 100 RPM to 650 RPM

★ Can thread round, square and inserted chaser dies

★ The most economical of ALL threading machines

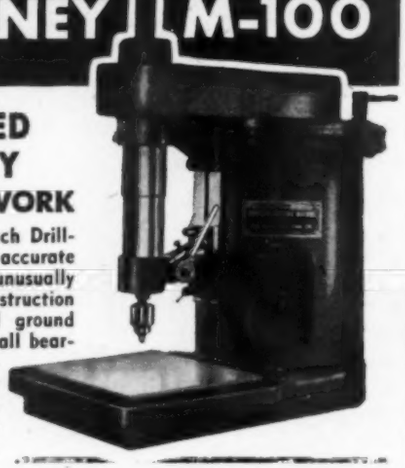


PRODUCTION MACHINES SINCE 1896

The James COULTER Machine Co.

BRIDGEPORT • CONNECTICUT • U.S.A.

SIGOURNEY M-100



MAINTAINED ACCURACY IN PRECISION WORK

The Sigourney M-100 Bench Drilling Machine is extremely accurate on precision jobs. It is unusually sturdy and rigid in construction . . . has hardened and ground spindles . . . and sealed ball bearings throughout. All moving parts are entirely closed for maximum operator safety. M-100 is built for long and steady service.

This sturdily constructed bench drilling machine is available in 1, 2, 3, and 4 spindle models . . . speeds from 4,000 to 10,000 r.p.m.

Send for Illustrated Bulletin

THE SIGOURNEY TOOL CO.
Hartford 6, Conn.

Sole Sales Agents

PRATT & WHITNEY

Division Niles-Bement-Pond Co. — West Hartford, Connecticut

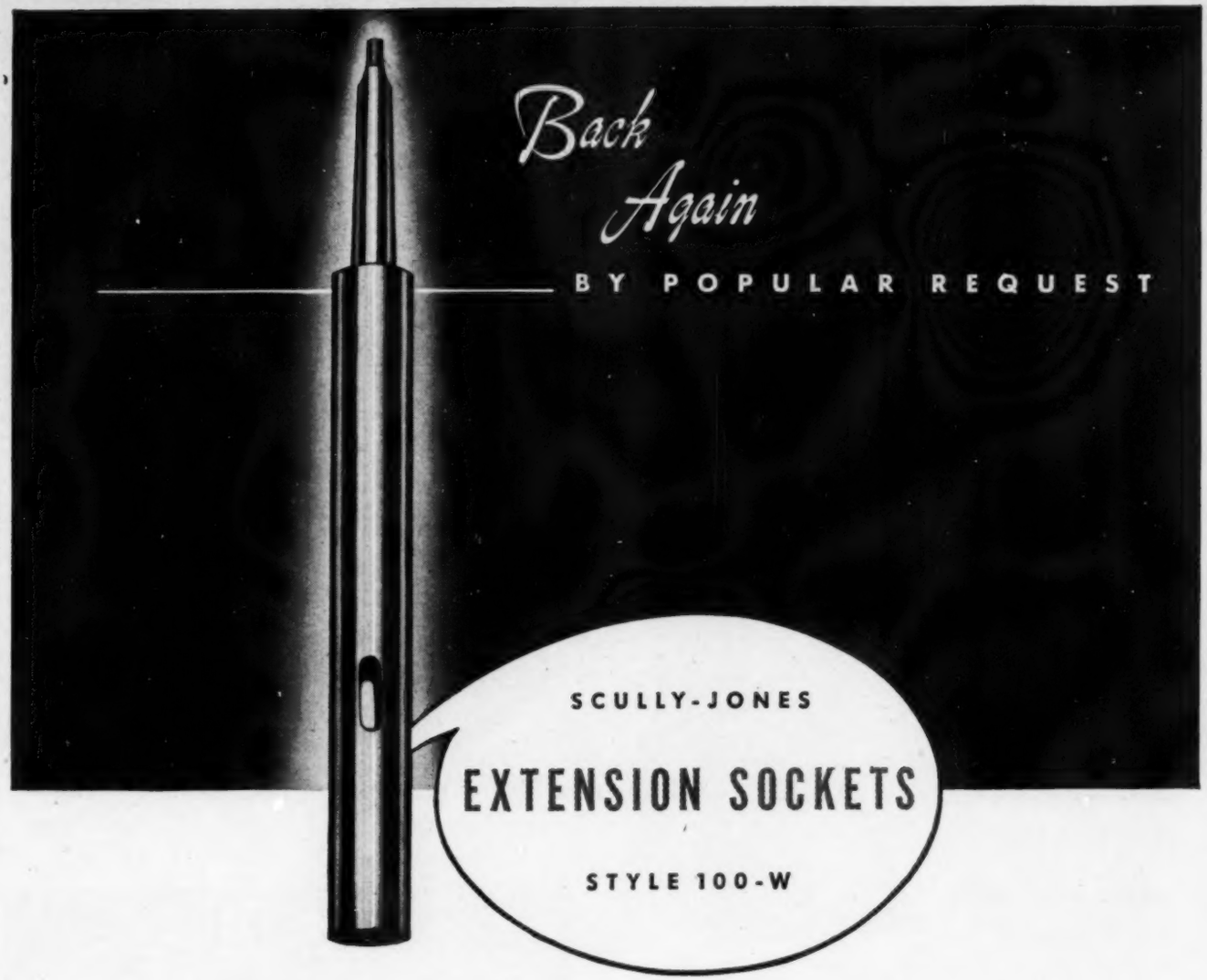
LONG ON SERVICE . . . SHORT ON COST

It Pays to Specify TUTHILL Model C for General Purpose Pumps

Low in first cost and engineered for long service with negligible maintenance, Tuthill Model C pumps are outstanding in general service on non-corrosive liquids. Compact and built for rugged service, these internal-gear rotary pumps operate efficiently in either rotation. Capacities from 1 to 200 g.p.m. at pressures up to 100 p.s.i. Direct drive, belt drive, V-belt units and stripped models available. Write for Model C bulletin.

TUTHILL PUMP COMPANY

939 East 95th Street • Chicago 19, Illinois



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You can convert spindles to larger or smaller tapers—and extend the spindles in your present Drill Presses, Radial Drills, Turret Lathes, Boring Mills, etc.—to utilize their productive capacity to a greater extent.

IMMEDIATE DELIVERY
ON ALL POPULAR SIZES

LONGER WEAR AND BETTER PERFORMANCE

Made to exact specifications. The tang and hole ends are heat-treated for longer wear and maintenance of concentricity. They will outlast the ordinary soft sockets and perform with greater accuracy.

FURNISHED WITH MORSE TAPER HOLES AND SHANKS *Three* *Series* LONG • MEDIUM • SHORT

For details see page 215 in Scully-Jones Tool Engineering Manual 500 which shows over 500 types and sizes of cutting tools, collet chucks, boring equipment, centers, etc.

Write for a folder on Extension Sockets.

Scully-Jones AND COMPANY

1902 SOUTH ROCKWELL STREET, CHICAGO 8, ILLINOIS

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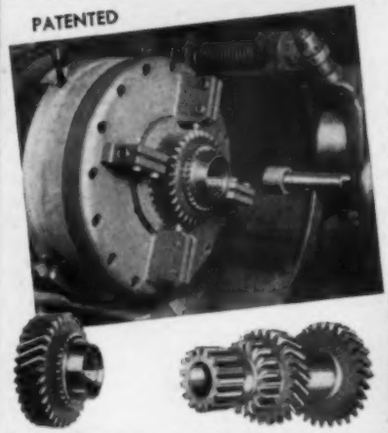

DIAPHRAGM CHUCKS

Look, a high speed, precision chuck with no parts to wear out! *Result:* Maximum accuracy, minimum maintenance! *Because* the Woodworth design assures the ultimate in concentric chucking.

Obviously, it will solve your precision chucking problems, as it has already for large manufacturers of gears and other production parts. Send your precision chucking problems to us—at no obligation.

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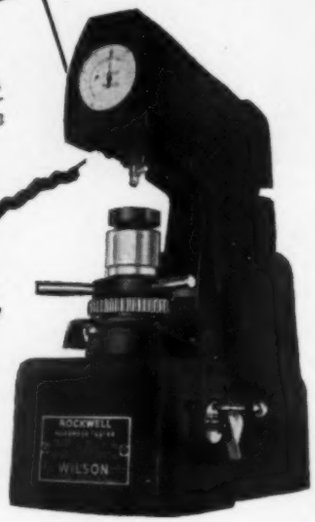
"ROCKWELL" HARDNESS TESTER
Made Only by Wilson



FOR LABORATORY, TOOL ROOM OR PRODUCTION LINE TESTING

For 27 years, Wilson has kept pace with—even anticipated—the needs of Industry in hardness testing equipment. There has been constant improvement in existing instruments and development of new ones to meet more exacting requirements.

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MECHANICAL INSTRUMENT CO., INC.
AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.
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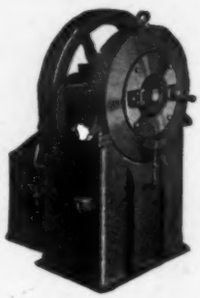

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ROTARY
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— with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Torrington Swaging Machine."

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56 Field Street Torrington, Conn.

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ESTABLISHED LIMITED
2729 SOUTH TROY STREET, CHICAGO 23, ILL.

STUART *service goes with every barrel*

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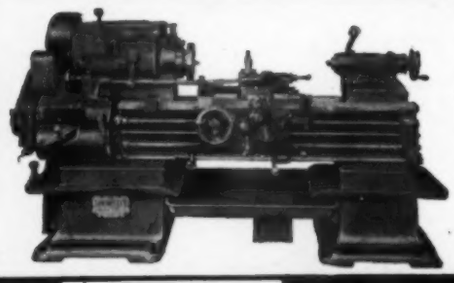
All Baumbach Die-Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing Leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

E. A. BAUMBACH MFG. CO., 1804 S. Kilbourn Ave., Chicago 23, Ill.

SPRINGFIELD GEARED HEAD LATHES



. . . versatile, efficient!

Springfield designs lathes to retain accuracy and speed over long periods of use. For quantity production or special use they're economical and extremely adaptable. Sizes available range from 14" to 30". *Write for descriptive bulletins, prices and deliveries.*

The SPRINGFIELD MACHINE TOOL COMPANY • • • SPRINGFIELD, OHIO, U.S.A.

MULTIPRESS* INCREASES PRODUCTION Over 100% for Electrical Products Manufacturer

Precision crimping of a thin metal tube to a ceramic bushing presented quite a production problem to a large west coast electrical products manufacturer. Due to variance in part dimensions and part fragility, the operation was formerly run on a manual type press, depending on operator skill for correct pressure. Production by this method was 500 pieces per hour, with a high percentage of rejects. By the MULTIPRESS method, feeding, positioning and ejection of parts is completely automatic, requiring the operator only for loading. *Production was upped to 1100 pieces per hour and rejects greatly reduced—using an unskilled worker!*

*T. M. Reg. U. S. Pat. Off.

The Denison HydrOILic Index Table was one of the standard accessories used with the MULTIPRESS in achieving this unusual production record. This accessory is especially designed for rapid feeding of parts to the MULTIPRESS ram, for peak production on small and medium sized parts. Since the exact pre-set pressure of the MULTIPRESS remains constant, regardless of part variations, high production can be maintained *without rejects!*

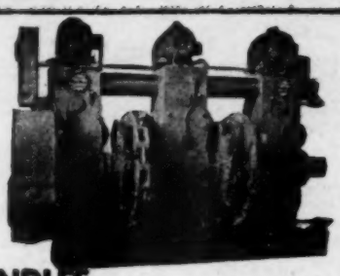
MULTIPRESS used with the Index Table has been boosting production in all industries, often to figures once thought impossible to attain. After you investigate MULTIPRESS with HydrOILic Index Table, you'll see how your own production figures may well do the same! Write today for complete data!

DENISON EQUIPMENT for APPLIED HydrOILics

THE DENISON ENGINEERING COMPANY

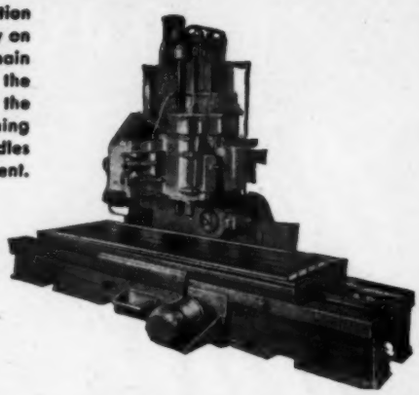
1164 Dublin Road • Columbus 16, Ohio

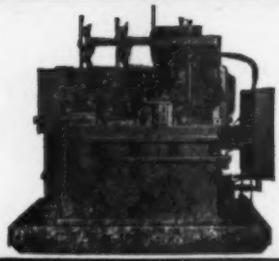
Roto-Matic MILLERS

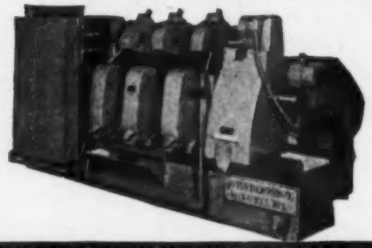


ROTARY DRUM TYPES •
VERTICALS • SINGLE AND MULTIPLE SPINDLES
PLANERS • RISE AND FALL • VERTICAL INDEXING

The ROTO-MATIC principle of continuous production insures the maximum of production and accuracy on any job to which a Miller has been adapted. Chain clamping mechanisms, where adapted, leave the operator free to load and unload parts. On the larger type Rotary Drum Type Millers finishing spindles are adjustable for toe cut. All spindles have provisions for micrometric endwise adjustment.







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DAVIS & THOMPSON COMPANY
MANUFACTURERS MACHINE TOOLS, MICROMETERS AND GAGES
MILWAUKEE WISCONSIN

These are the NEW

DUBLIFE Plug Gages with

COLORED Plastic (INSULATING) COLLETS

GREEN for "GO"

RED for "NO GO"

Colored Collets identify plug instantly. Weight is reduced. Plugs securely locked without marring or scratching plugs as with metal collets.

New Light Weight Handle with these collets.

DUBLIFE

In one and same balanced handle, 2 "GO" and 2 "NO GO" Plugs. Tolerances to .00002. Reverse either plug when wear shows and you have a new, fresh gage. Time saving! Gage saving! Money saving! It is to your advantage to know about DUBLIFE GAGES with colored plastic collets and light weight handles. Send for complete catalog showing DUBLIFE and A. G. Design Gages.

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You, too, may have a water-soluble grinding problem.

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THE W&B CO

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from the originators of grinding lubricants?

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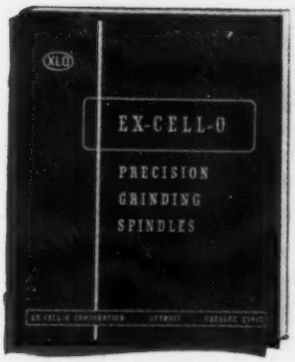
Specify EX-CELL-O Grinding Spindles

When you specify EX-CELL-O Grinding Spindles—for new equipment or as replacement—you get a spindle definitely designed and manufactured for *precision* work, one that will keep your grinder operating smoothly and at top efficiency. . . . For a quarter of a century EX-CELL-O spindles have been the favorite of numerous grinder and other machine tool builders. . . . If you want to get the utmost in grinder performance, be sure to specify EX-CELL-O Grinding Spindles—with *sealed-in lubrication!*

XLO
EX-CELL-O *for* PRECISION



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New 80-page Ex-Cell-O Grinding Spindle Catalog. Free to requests on company letterheads. Ask for Catalog No. 25962.

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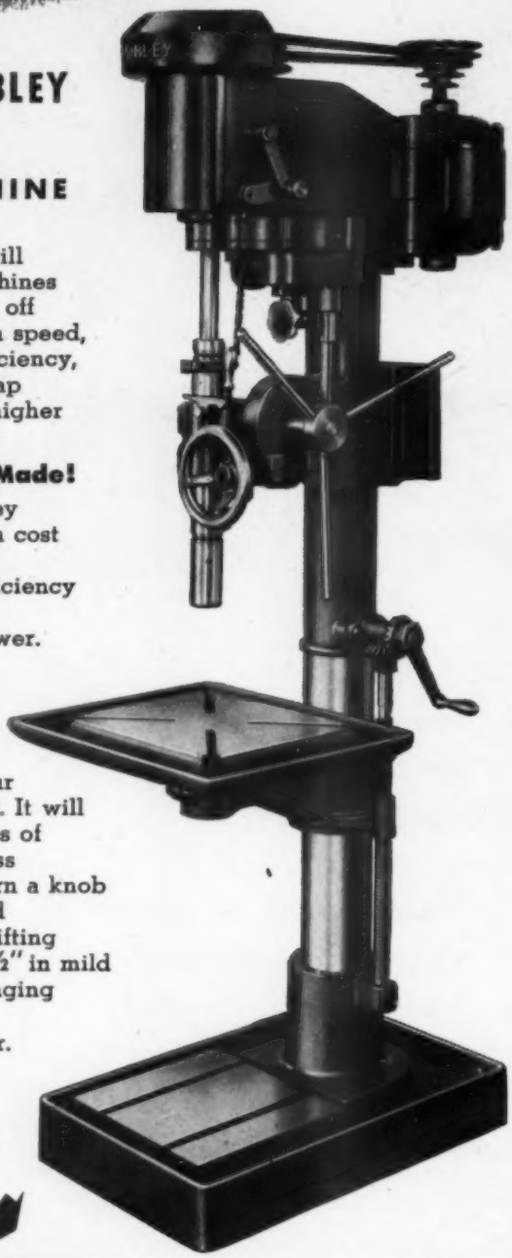
HOW LONG—

SINCE YOU'VE WRITTEN OFF YOUR OLD DRILLING MACHINES?

MODEL C-20 SIBLEY
20" SWING DRILLING MACHINE



Many manufacturers are still operating old drilling machines whose costs were written off years ago. Now obsolete in speed, accuracy and operator efficiency, they are a decided handicap in paring costs to offset higher labor rates.

Cost Savings Can Be Made!

The new model C-20 Sibley will furnish you savings on cost per piece by—

1. Increased operator efficiency and output.
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3. Finer accuracy.

Install a new model C-20 in your plant and make a Time and Motion Study comparison with your present drilling equipment. It will demonstrate the advantages of such features as easy access to controls—where you turn a knob to select the proper geared power feed; convenient shifting of V-belt; power to drill 1½" in mild steel; 8 spindle speeds ranging from 65 to 1360 R.P.M. powered by a 2 H.P. motor.

GET COMPLETE INFORMATION ON THE SIBLEY MODEL C-20

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MACHINE & FOUNDRY CORP.
28 EAST TUTT STREET
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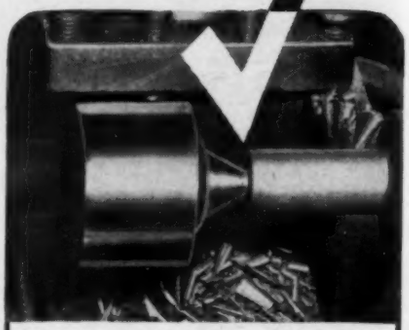
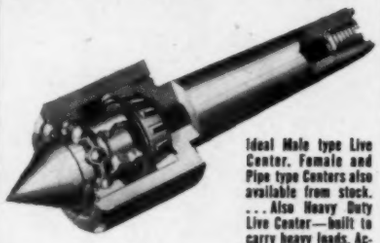


Turning 3" dia. cast iron bar at approximately 225 surface ft. per min. (⅜" wide cut, 300 rpm., .015" feed; 16" overhang)



Ideal Male type Live Center. Female and Pipe type Centers also available from stock. . . . Also Heavy Duty Live Center—built to carry heavy loads. Accurate to .0005.

Use IDEAL
LIVE CENTERS
to Eliminate Burning of Center Gouging of Work

• Check the advantages of using Ideal Live Centers on your lathes—see how much you can save by doing a mass production job with improved quality and better results per man-hour.

Ideal Live Centers permit deeper cuts at higher speeds because they turn with the work. No friction between the Center and the work—no burning—no gauging—none of the continued expense of fast-wearing dead centers.

Investigate the outstanding features of Ideal Live Center design and precision construction—unique bearing arrangement . . . specially selected bearings . . . short overhang . . . all parts hardened and ground . . . thoroughly tested and proved. Highest quality at no extra cost!

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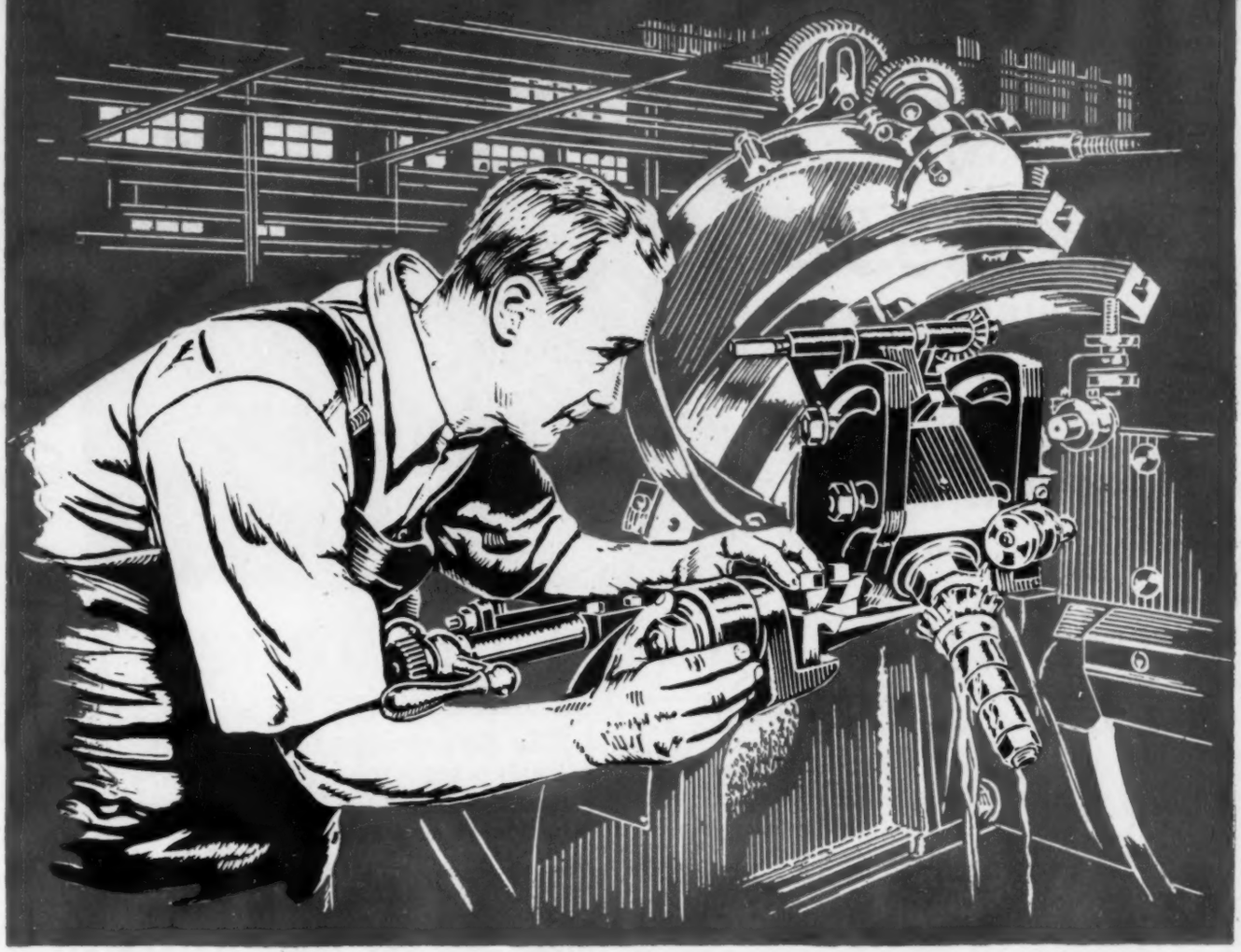

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"Tool life increased 33⅓% . . .
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These statements, made by leading manufacturers are paralleled wherever Tycol Dual Purpose Oils are used. You, too, will find that *one* versatile oil not only does the work of two separate oils, but it steps up production . . . slashes costs . . . reduces cutting time . . . provides better finishes.

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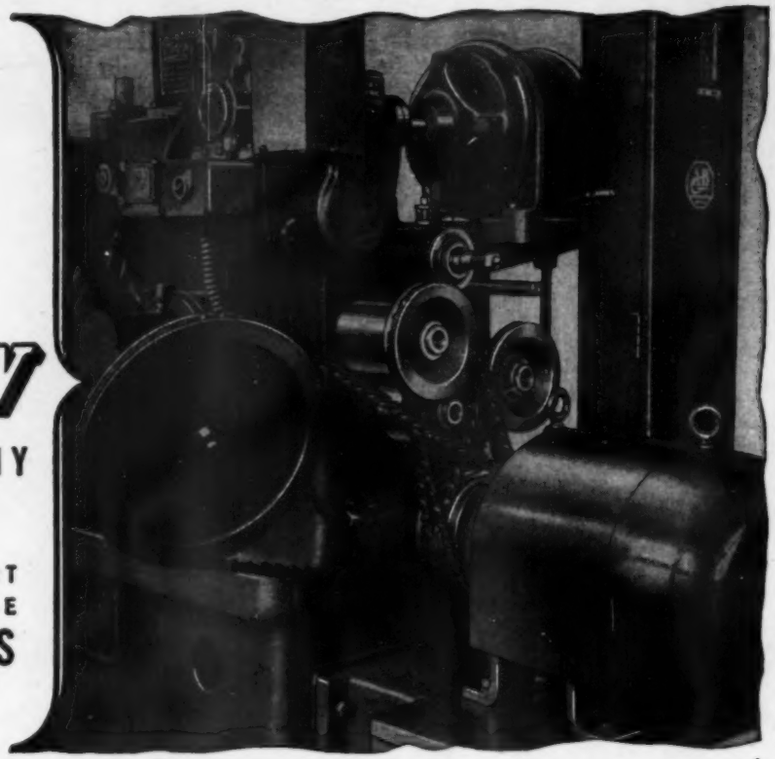
MULTIPLE SPINDLE
CHUCKING MACHINES



The RANDALL & STICKNEY
Platform Gauge

. . . . takes work up to 7 inches

Work of similar size can be quickly and easily inspected by setting gauge head at desired height with standard block or plug. Spindle on gauge head travels ½".
Dial graduated 0 to 50 in thousandths; second-hand records 10ths of inches. Can be furnished to read to .01 mm.
Base 8" square; height 13"; weight 18½ lbs.

Investigate Now!

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The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE

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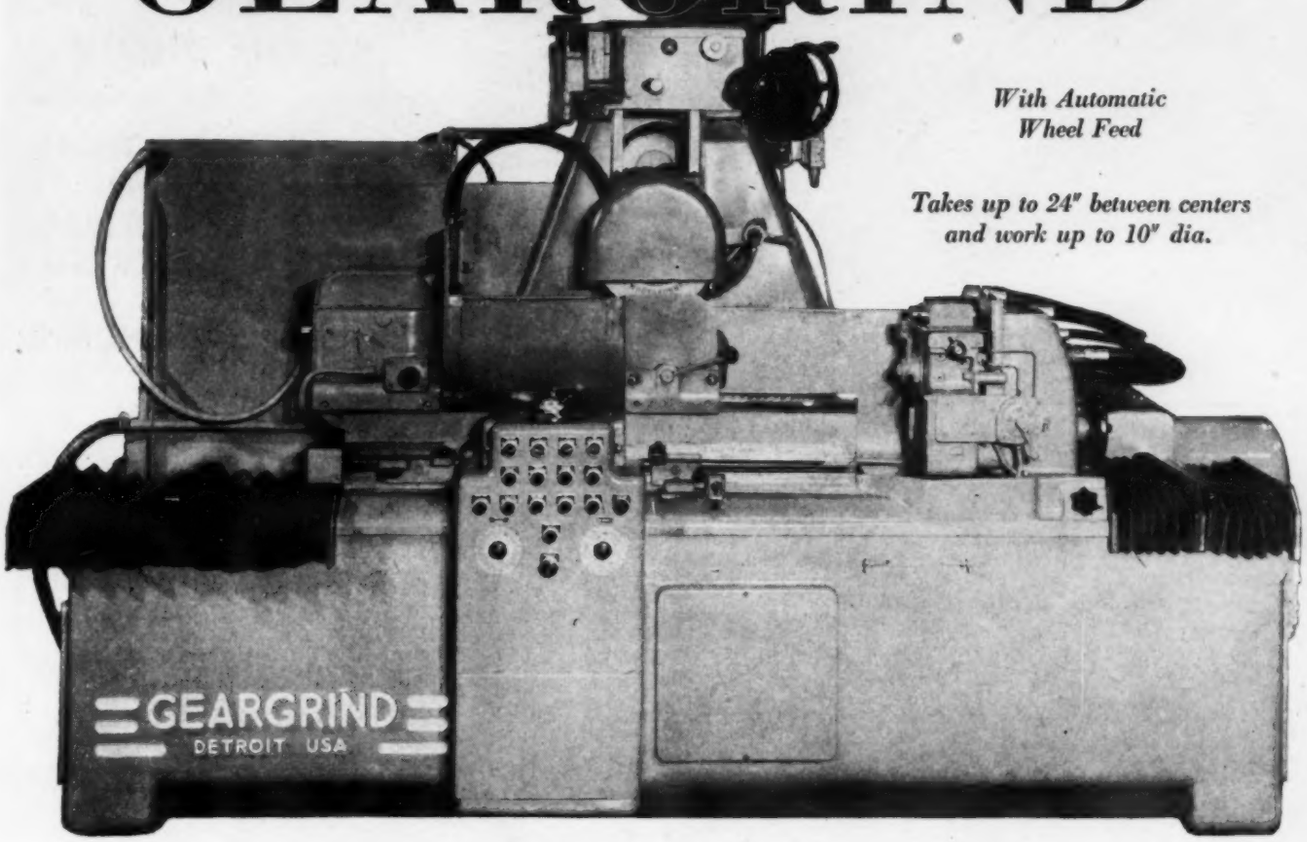
FEATURES: 1. Low Hung Drive to Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all Speeds. 4. Concentrated and Convenient Push-button Controls. 5. Constructed on Unit Principle.

THE CARLTON
MACHINE TOOL COMPANY
CINCINNATI 25, OHIO, U. S. A.

The NEW

GEARGRIND



With Automatic Wheel Feed

Takes up to 24" between centers and work up to 10" dia.

Three to Four Times Faster

Work reciprocates past the grinding wheel, using a fast, short stroke. At each reversal point the grinding wheel feeds down, automatically.

Grinding continues on one tooth space until a "rough size" is reached, after which the work is indexed and the grinding wheel head re-set.

After a pre-set number of teeth have been "roughed out" the dresser moves into position for trueing the grinding wheel.

All these operations are automatic, and adjustments for number of teeth ground before dressing, total down feed and number of cuts is readily variable over a wide range.

Grinding by this new GEARGRIND method is done in ⅓ to ¼ of the time required by any previous gear grinding machine of comparable capacity.

WRITE for complete information.

The GEAR GRINDING MACHINE COMPANY
DETROIT 11, MICH. U.S.A.

MELIN now offers a complete line of

PRECISION MADE TOOLS

for the Metal Working Industry

To supplement our original line of end mills, we have selected a number of famous name tools . . . and now offer a complete line, everything needed by the modern machine shop to attain economical, efficient, high speed production.

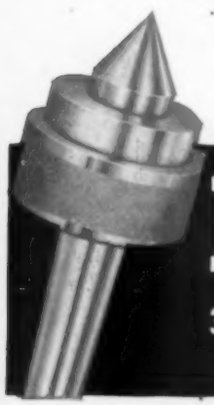
✓Check your needs

- End Mills
- Router Bits
- Center Drills
- Countersinks
- Counterbores
- Die Sinking Cutters
- Corner Rounding Tools
- Special Tools
- Howard Live Centers
- Tool Holders
- Ferriet Powermax Air Motors and Cast Alloy Rotary Files
- Micrometer Adjustable Boring Bar

For greater cutting efficiency and longer life

MELIN 3 FLUTE END MILLS

After years of research, Melin Mills introduced the revolutionary new 3 flute end mills . . . combining the fast stock removing qualities of the two flute with the smooth finishing qualities of the four flute. These end mills have been accepted from coast to coast as superior cutting tools offering qualities not found in other end mills. You can speed up production and enjoy a new high in precision workmanship by having a complete stock of Melin 3 flute end mills on hand at all times.



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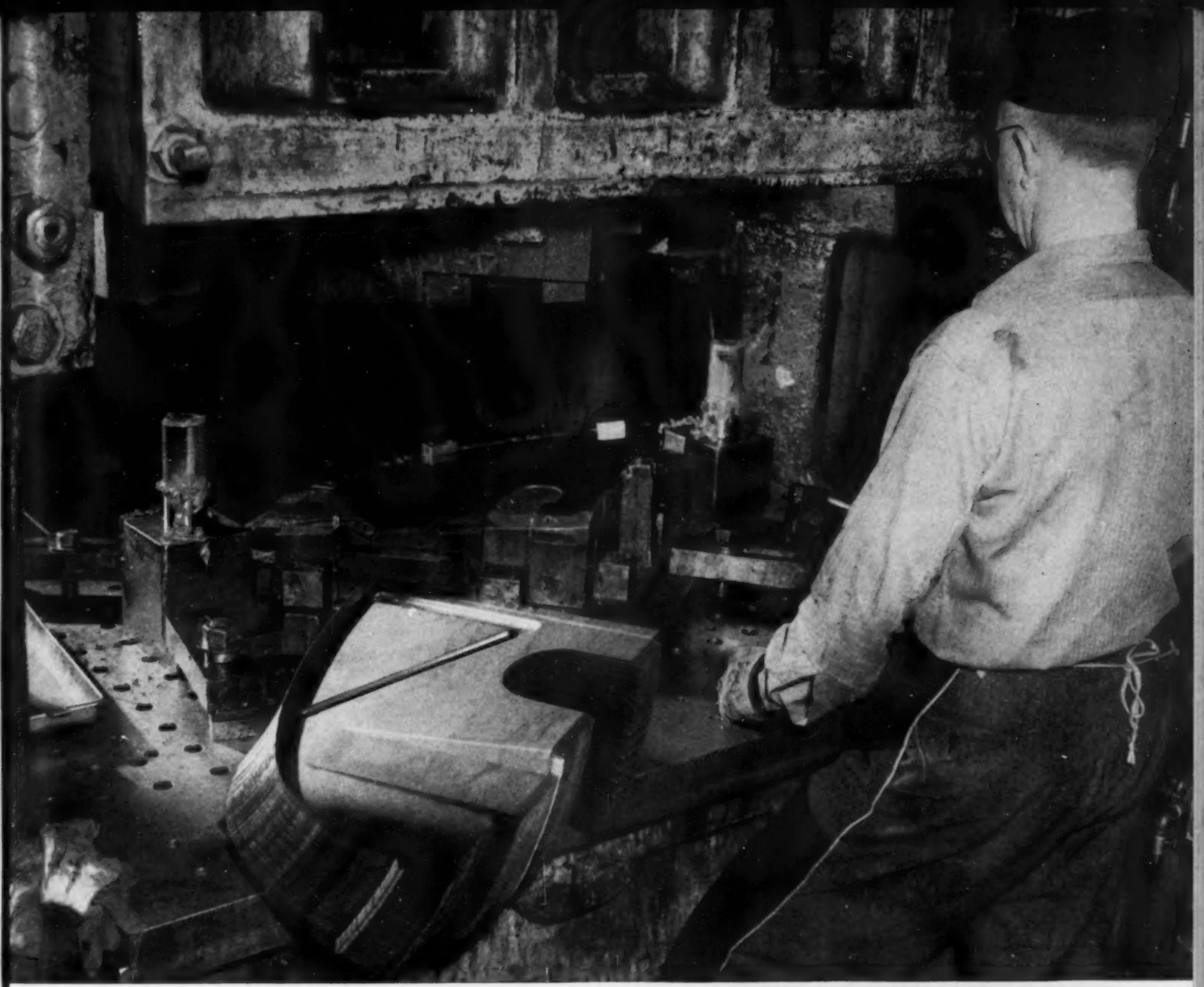


Breakage reduced 15% . . .

Consumption cut 50% with . . .

Stanostamp

NO WONDER Stanostamp gets the stamp of approval from a Midwest metal-working plant. After changing to this superior stamping compound, the plant operator reports a 15% reduction in scrapped stampings—with a corresponding saving in steel and press time—plus a 50% saving in stamping compound.

Shown above is one of the more difficult operations in this plant—stamping 18-gauge steel sheets with a 3½-inch straight draw for coaster wagon bodies.

Available in three grades (described at right), Stanostamp is compounded to cover many conditions encountered in sheet metal forming. For specific applications, you can obtain the help of an experienced Standard Oil Engineer. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

Available in 3 grades—

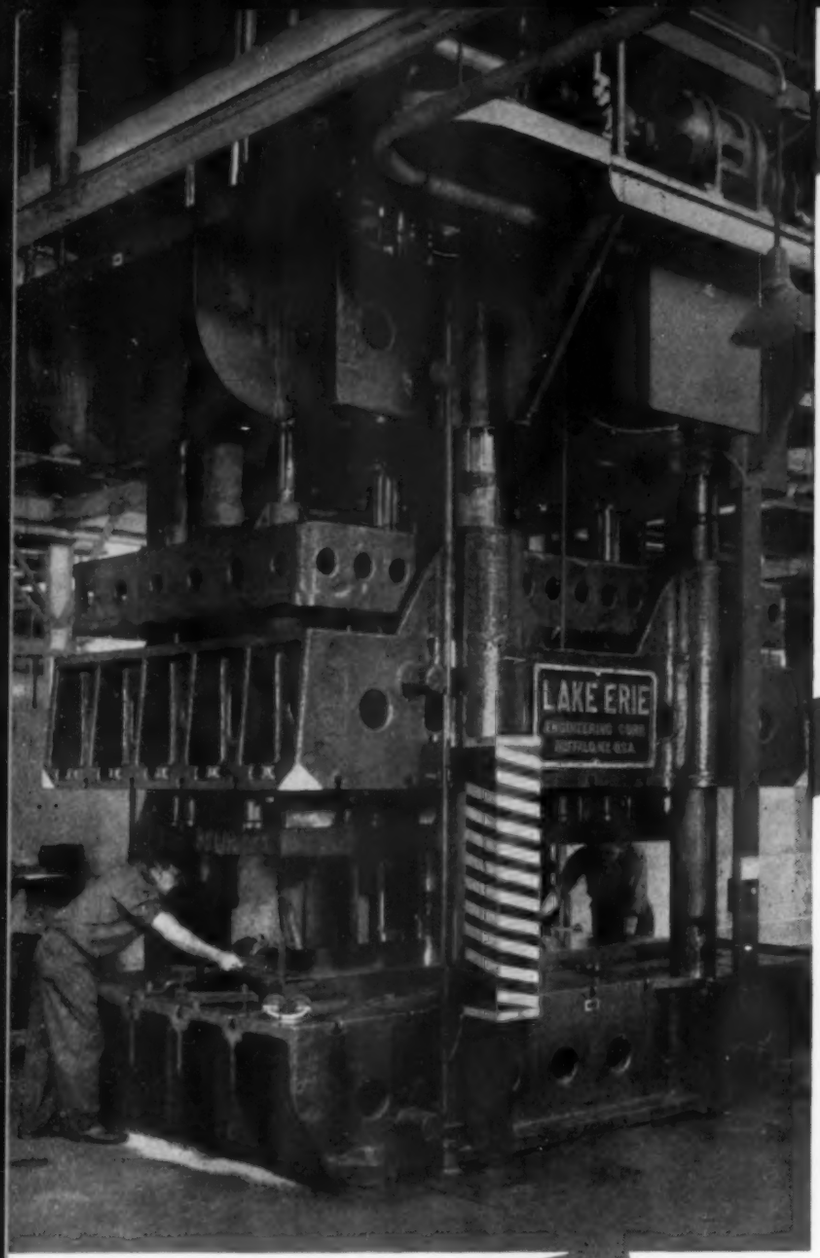
STANOSTAMP "C"—a white, heavy fluid paste compound containing an inert, non-abrasive, mineral filler for protection of dies and work. It is particularly recommended for lighter operations.

STANOSTAMP "S"—a yellow, heavy fluid paste compound containing a suspension of fine sulfur for high film strength. It is especially adapted for heavy metal and stainless steel operations.

STANOSTAMP "G"—a black, heavy fluid paste compound containing graphite in suspension. To be used without blending, it is recommended for severe conditions of deep draws, sharp angles, etc.

All grades of Stanostamp are easily applied, have excellent washability, give adequate rust protection.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE



Tests prove hydraulic oil "like new" after three years' operation

January 1944, Stanoil was placed in a large hydrau press, newly installed at the Flour City Ornamental Ir Co., Minneapolis.

June 1947, a laboratory inspection was made of t original fill of Stanoil, then in its fourth year of almo continuous service. Below are the significant test figur

Viscosity (SUV @ 100°F.) . .	303 seconds
Oxidized oil	.01%
Color Increase (NPA)	½ unit

The viscosity figure of 303 seconds was within the ne oil specification range of 300-310 seconds. This fact, pl the extremely low per cent of oxidized oil and the slig color change, indicated that there had been practically n oxidation of the oil in three years. Because of these facto the hydraulic system stayed clean and the hydraulic co trols functioned smoothly on this press at all times.

Stanoils contain an oxidation inhibitor and an anti-fo additive which give these oils long life and reliable ope ating quality in hydraulic systems, as well as in circulati systems, speed reducers and similar equipment. A Stan ard Oil Lubrication Engineer will help you put this ec nomical oil to work in your plant. Write Standard O Company (Indiana), 910 South Michigan Avenue, C cago 80, Illinois.

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DE LAVAL CENTRIFUGE REMOVES FROM 10 FACTORY OILS

— AND THE RESULT IN EACH CASE!

KIND OF OIL	DE LAVAL CENTRIFUGAL OIL PURIFIER removes	RESULT
CUTTING OIL	Grit Metallic Particles Water	Oil can safely be re-used indefinitely Less dermatitis Increases tool life
DRAWING OIL	Scale Metallic Particles	Saves wear on dies
GRINDING COOLANT	Abrasive Particles Metallic Particles	Saves wheel dressing time Better finishes in less time Likelihood of distorting work decreased
HONING OIL	Abrasive Particles Metallic Particles	Reduces rejects Insures mirrorlike finish
HYDRAULIC OIL BALER OIL	Condensate Solid Impurities	Eliminates rust Saves pumps and control mechanisms Valve sticking minimized Prevents hardening of leather seals
RUN-IN TEST OIL	Metallic Particles Core Sand	Tests are more reliable Oil can be re-used indefinitely with perfect safety
QUENCHING OIL	Scale and Dirt Carbon Water	Increases oil life Eliminates "soft-spots" due to moisture
SHOCK ABSORBER OIL	Metallic Particles Dirt Solid Impurities	Prevents particles causing piston wear Assures correct cushion
SLUSHING COMPOUND	Dirt Dust	Rust-preventing compound can give full measure of protection
WASHING OIL	Metallic Particles Dust Dirt	Prevents work being scored

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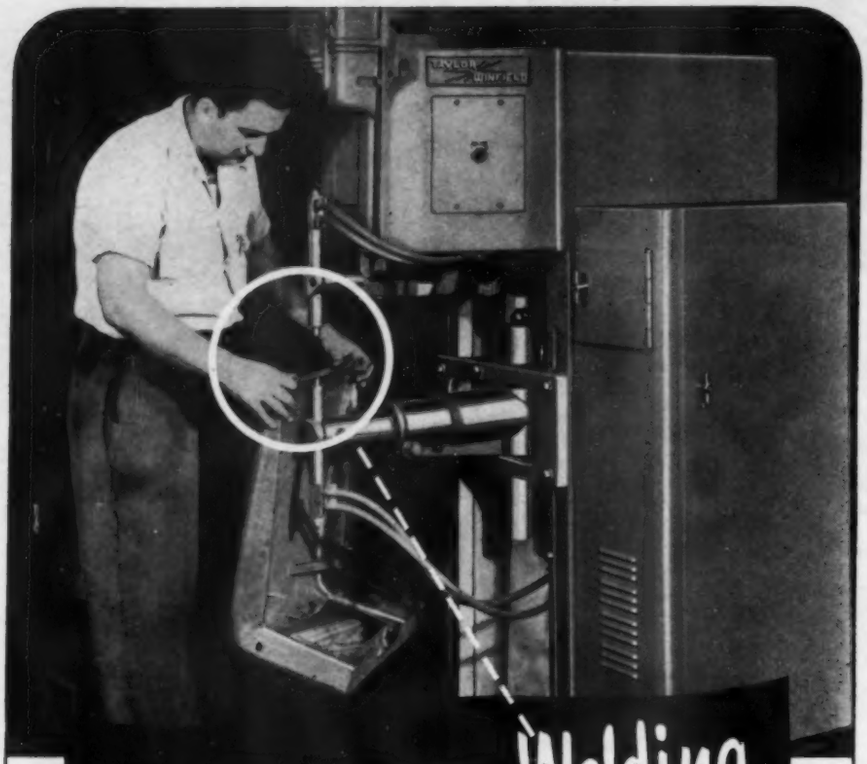

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...use Ampco-Weld resistance welding electrodes in modern equipment...increase the number of welds made, substantially reduce your costs

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RW-5

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This Special Report explains in detail the supersonic, radiographic, spectroscopic and magnetic methods of Inspection . . . points out how each can be used effectively. Illustrations, graphs, photographs, clarify the factual, authoritative text.

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Magazine of Metalworking Production

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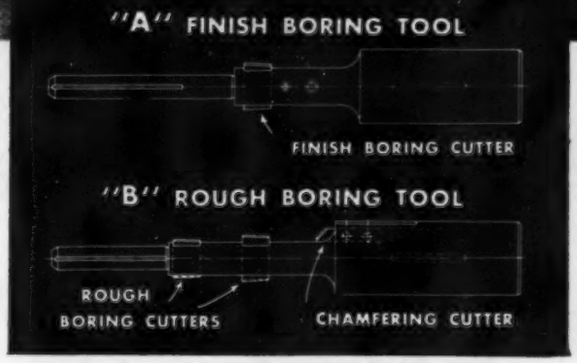
MADISON *Boreaming increases parts production 70% for "EASY" washers

*Completed boring operation



Here's the story: An aluminum casting required the following operations on inside and outside diameters — Rough bore 1st ID — Rough bore 2nd ID — Finish 1st ID — Chamfer ID — Face Shoulder — Turn 1st OD — Turn 2nd OD — Finish 1st OD — Finish 2nd OD — Thread 2nd OD.

Using single point tools, all six of the turret faces were required to finish a single casting. 19.7 parts per hour were completed.

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MADISON MANUFACTURING COMPANY
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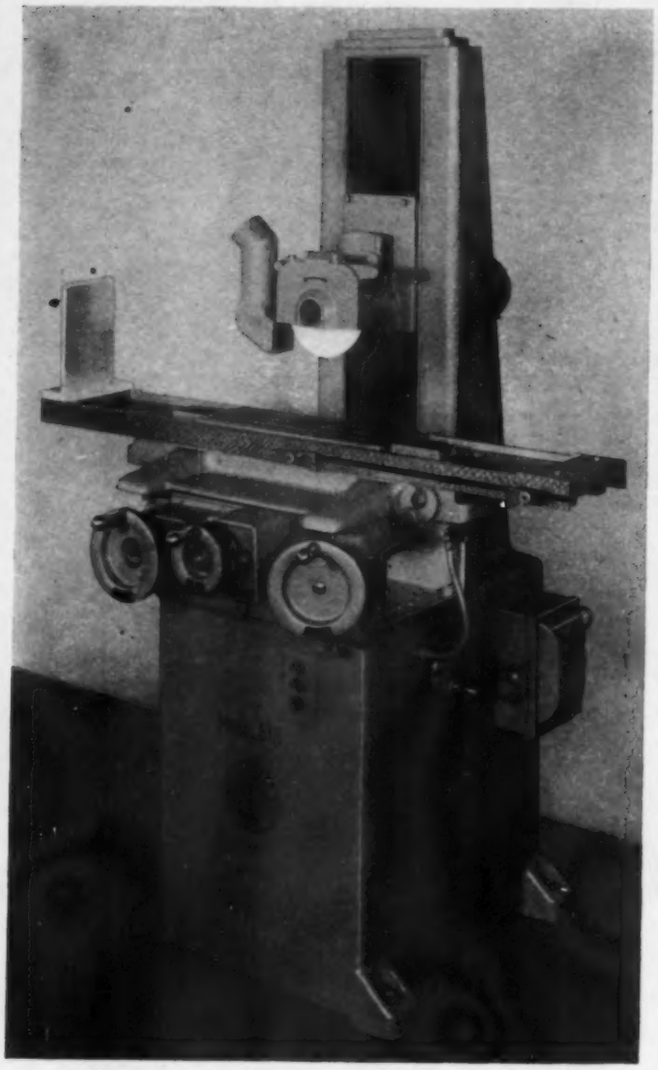

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12 to 35 Ft. Per Minute

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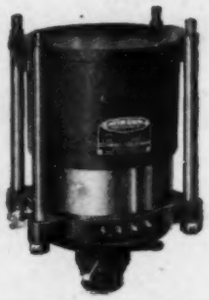

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Self-contained unit, quickly installed on any punch press.

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MAXIMUM DRAW						
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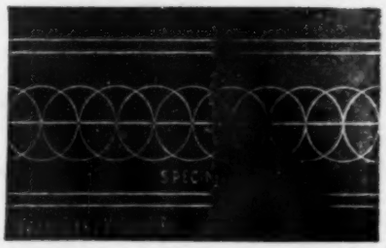

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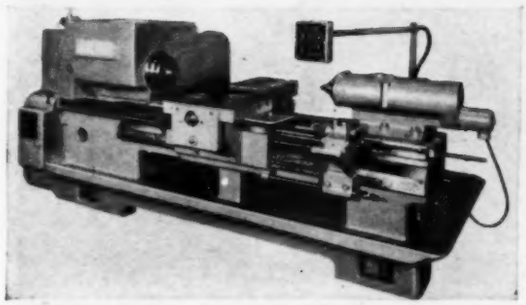

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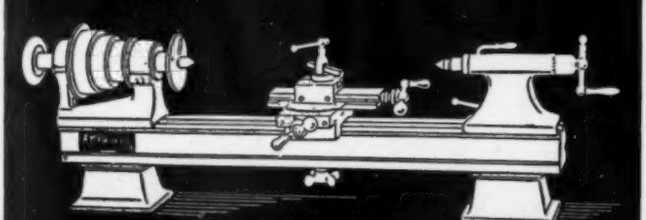

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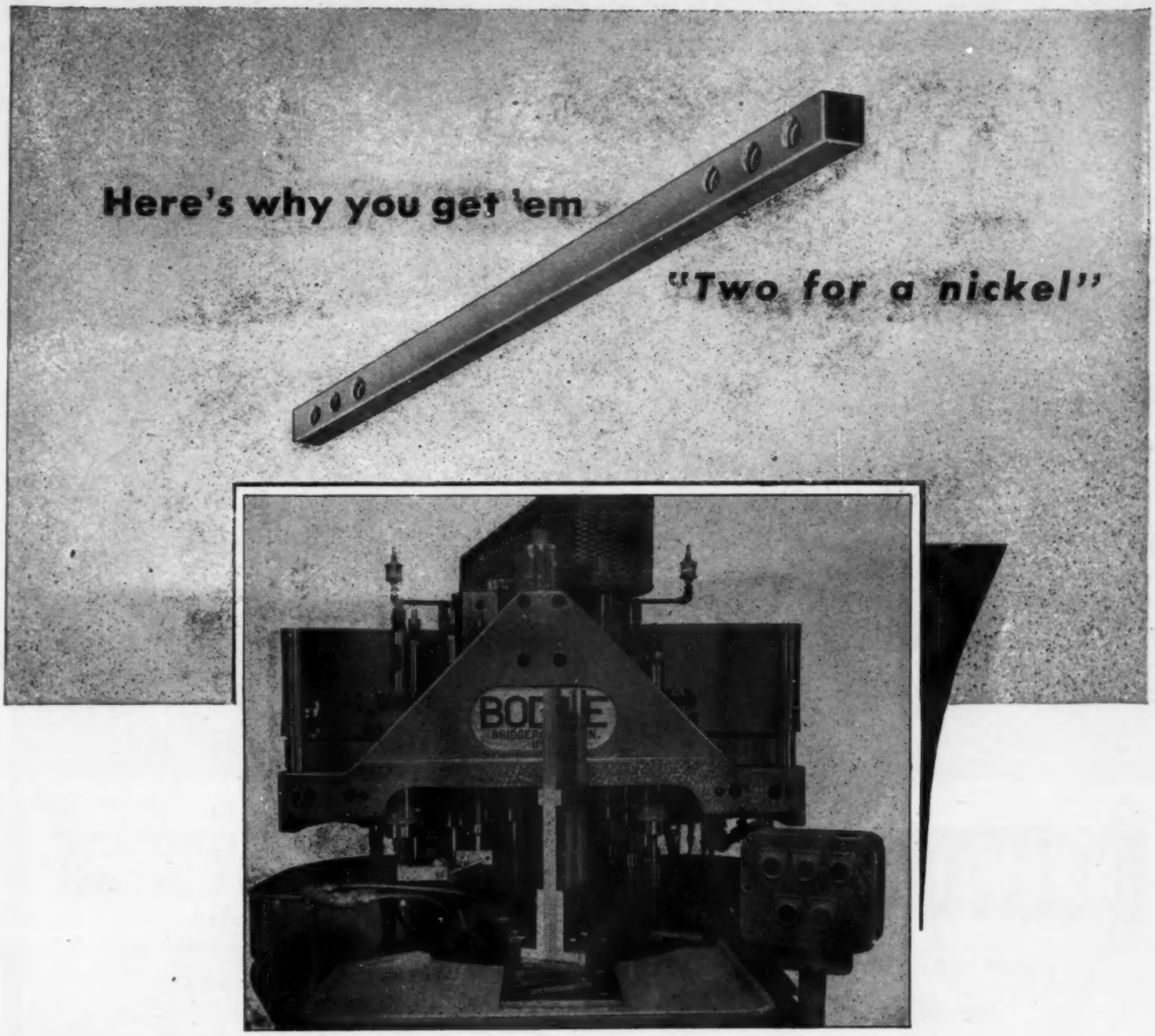

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the tool that converts drilling machines into key-seaters and saves time and money

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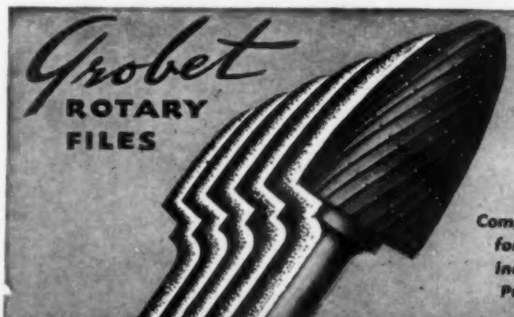

The Complete Line for Every Industrial Purpose

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IMPORTERS OF GROBET SWISS FILES — MFRS. OF GROBET ROTARY FILES

The SIDES of a V-BELT are what GRIP the PULLEY

-Naturally, it's the SIDES that GET the WEAR

Diagram of V-Belt in Sheave-Groove

The story of what wears out a V-Belt—and how a belt can be built to withstand this wear a longer time — is quickly told. Here are the facts:—

Only the sides of a V-Belt touch the pulley. The sides do all the gripping on the pulley. The sides pick up the load. They transmit that load to the belt as a whole. Then, once again, the sides grip the driven pulley and deliver the power to it. And the sides take all the wear against the sheave-groove wall.

This explains why everyone who works around machines has always noticed that the *sidewall* of the *ordinary* V-belt is the part that wears out first!

The CONCAVE SIDE is a GATES PATENT

That's Why the *Patented* CONCAVE SIDE That *REDUCES* Wear on Sidewalls is So *IMPORTANT*

Naturally, since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the middle of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belt can possibly give.

The Concave Side is MORE Important NOW Than Ever Before!

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Gates

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"World's Largest Maker of V-Belts"

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

Straight Sided V-Belt

Fig. 1

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

Fig. 1-A

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall

Fig. 2

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley.

Fig. 2-A

No bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

4711

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6" DRILLING AREA
¼ capacity
21/32 center

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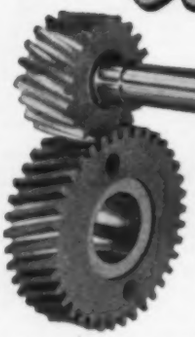

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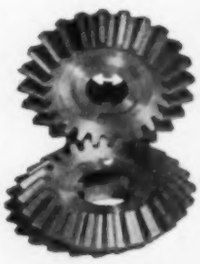

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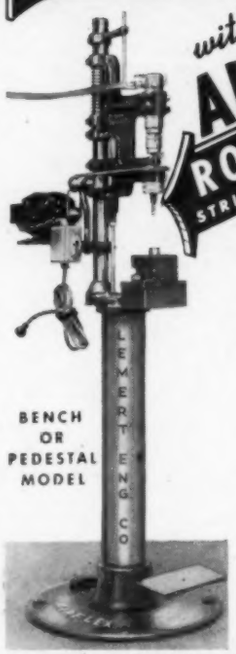

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that looks different . . . is different!

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REFER D-15—SAPPHIRE SHORTS

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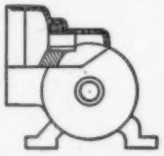

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. . . for over 70 years

ALMOND THREE-JAW DRILL CHUCKS—the first to be placed on the market more than seventy years ago—pioneered the field of drill chucks. During all these many years, ALMOND CHUCKS have continued to be a necessary part in the logical procedure of machine developments. Made in types and sizes to fit all machine tools and portable drills.

Write for further information.

T. R. ALMOND MFG. CO.
Ashburnham, Mass., U.S.A.

PORTRAIT OF A SPEED-WET DISC "TAKING IT"

...and coming back for 12 TIMES / MORE!

THERE'S AN INTERESTING LESSON in production economy back of this picture. The camera has accurately "caught" the flexural distortion of the grinding disc, as it "hugs" the work contour. But the story behind the picture is even more striking. Speed-Wet Metalite Fibre Discs, like the one in the picture, are averaging 12 castings per disc as against *one* for their nearest competitor—and at no greater cost.

Technically, the answer to this extra flexural strength and cutting life of Speed-Wet Discs is in their all-fibre backing and resin bonding. The all-fibre backing withstands flexing like a steel spring. The heat-set resin bonding resists cutting heat and retards grit-shedding and glazing.

As a proving ground for grinding disc performance, this severe application demonstrates true product merit and the assurance of "value received." It is thus more than likely that a job test of Speed-Wet Discs in your own plant will improve your production too. We'll be glad to arrange it at your convenience—just return the coupon.

TO: BEHR-MANNING, Troy, N. Y.
Please arrange to job-test your new Speed-Wet Discs at our plant.
Firm Name .....
Address .....
City..... Zone..... State.....
By ..... Title.....

Announcing
OUR NEW
SERVICE PACKAGING
JANUARY 1ST

BEHR-MANNING
(DIVISION OF NORTON COMPANY)
TROY, N. Y.

Announcing the FORD WHIPPET ELECTRIC HOIST

On behalf of your Ford Chain Block distributor, as well as ourselves, we take great pleasure in announcing this new postwar electric hoist . . . The streamlined *WHIPPET* offers a high degree of simplicity, durability and accessibility of parts. Yes, the *WHIPPET* is faster, safer, more powerful, more dependable. Capacities range from 250 to 2000 pounds. Ask your distributor or send for copy of new descriptive folder DH-1325.

ACCO

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FORD CHAIN BLOCK DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

The Cincinnati

WET ABRASIVE CUT-OFF MACHINE

. . . for straight or angle cutting of practically any material used in general manufacturing . . . including such metals as brass, copper, aluminum, as well as fibrous and plastic materials in various sizes, angles and shapes.

Suitable for making straight or angle cuts in solids up to 2¼" or tubing up to 3½" diameter. Same vise is suitable for various cuts. Maximum capacity is 2¼" in cutting angles up to 45°. Graduations on table make angle-cutting fast and accurate.

Alternating or direct current.
Write for complete details.

TRADE The Cincinnati MARK
THE CINCINNATI ELECTRICAL TOOL CO.
Division of THE R. K. LeBLOND MACHINE TOOL CO.

Severance CARBIDE MIDGET MILLS

Operate at grinding-wheel speeds
Outlast scores of mounted points
Cut 50 times faster
MANY SHAPES and SIZES
Cut hard materials - Rockwell 65-C

¾ SIZE

Write for Catalog No. 16

May be REGROUND time-after-time by Severance—savings are thus multiplied

SEVERANCE TOOL INDUSTRIES, INC.
726 Iowa Ave., Saginaw, Michigan

PRESSES
FEEDS
AUTOMATIC EQUIPMENT
THE V & O Press Co.
HUDSON N. Y.

Any MICROMETER 1" to 18" size trued and lapped square

Pearson Precision "Micrometer Lapping Fixture" gives your plant constant *exact check* on all micrometers. Any good toolroom man can operate it expertly. No disassembling of micrometer other than removing spindle. Laps micrometer in exact right angle with center line of spindle; and in perfect alignment with end of micrometer spindle. Also makes an excellent comparator. Saving an hour's rejects may more than pay for this fixture.

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L-W

SWIVEL BASE MILLING MACHINE VISES

MASTER $38.00

Jaws: 6½" wide, 2" deep.
Opens 4" with jaws, 5¼" without.
Wt. complete with crank, boxed, 85 lb.

★

JUNIOR $28.35

Jaws: 4½" wide, 1¾" deep.
Opens 3" with jaws, 3½" without.
Wt. complete with crank, boxed, 35 lb.

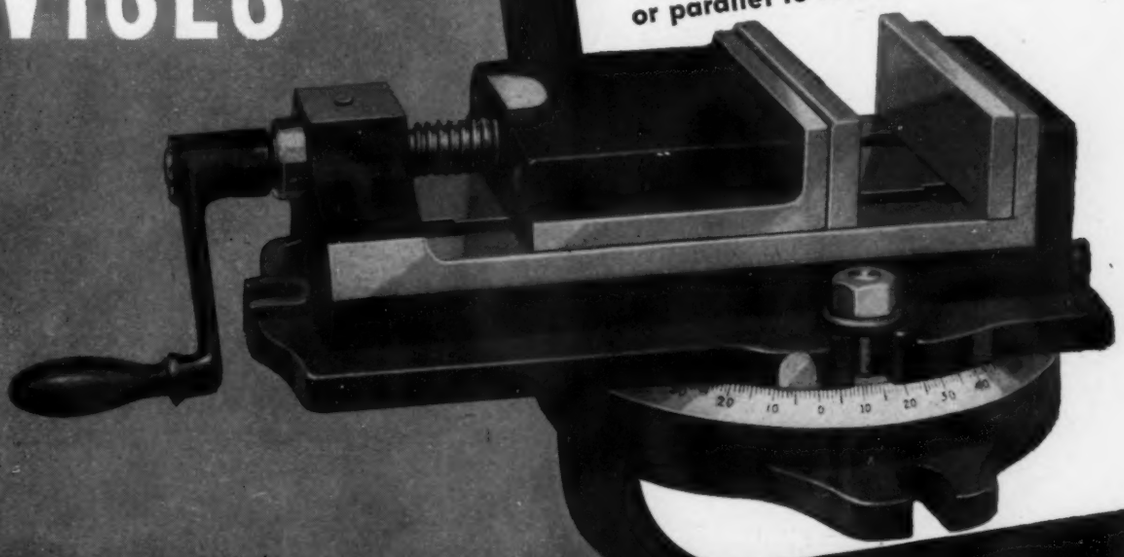
★

STEEL JAWS
Suited to drill press and shaper work.

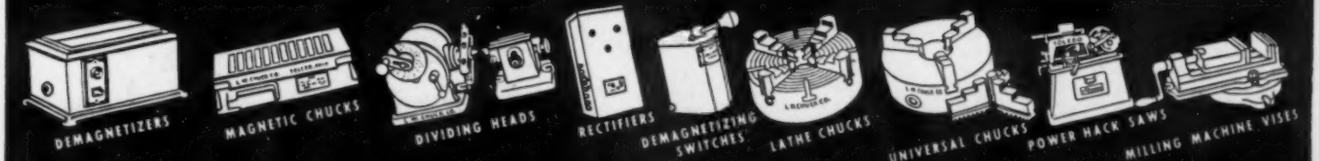
GRADUATED BASE
Can be used plain or swivel.

LARGE ACME STEEL SCREW
Contributes sturdiness and durability.

FOUR BOLT AND KEY SLOTS
are provided for rigidly attaching to machine table so that work holding surfaces are at true right angles or parallel to table.



Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



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Vitrified Wheels

. . . for

VITRIFIED

intricate precision grinding or coarse heavy work

Inasmuch as Vitrified manufactures a complete line of Grinding Wheels in numerous grades, grain combinations and bondings, it is merely a matter of selecting the right wheel for the work to be handled.

Because of this wide selection, a Vitrified Wheel can be depended on for economy, speed and long life in the specific service for which it is intended.

Whether your work involves roughing, finishing, surfacing, edging, or cleaning, hand, automatic or swing grinding, there is a Vitrified Wheel which will give you maximum service at minimum cost.

Why not call in a Vitrified representative to show you how you can make worthwhile saving in your grinding operations?

VITRIFIED WHEEL CO., WESTFIELD, MASS.

ABRASIVE

ACCURACY BOOSTS PRODUCTION

No. 1G	INTERNAL GRINDER	No. 34	VERTICAL SPINDLE SURFACE GRINDER
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ALL MATERIALS

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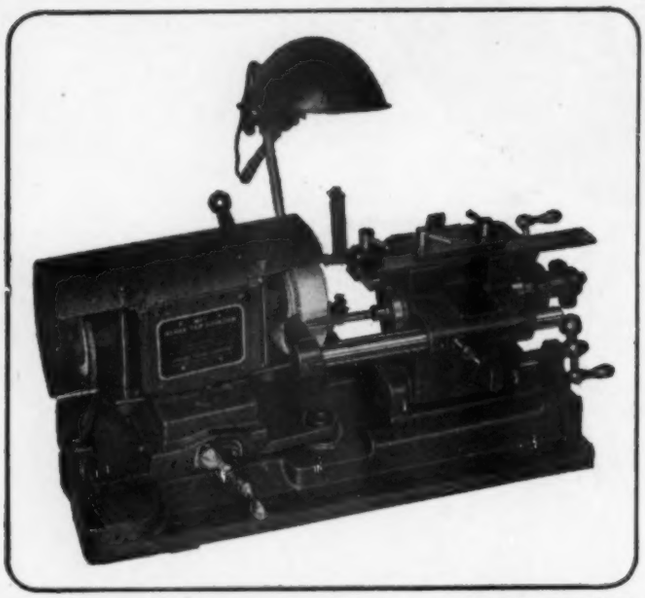
"FORMERLY 5,000 NOW 40,000 HOLES PER TAP"

We have many similar comments in our files from satisfied users of . . .



The BLAKE TAP GRINDER

YOU TOO, if you use taps regularly, will find a Blake Tap Grinder one of your most profitable investments. You'll be amazed at the savings in tool and labor costs, the improved quality of threads, and the increased production—all directly traceable to using only sharp taps and having them always on hand.

With the BLAKE you can easily, quickly and accurately chamfer-sharpen taps with 2, 3, 4, 5, 6, 8 or 10 flutes—both right-hand and left-hand taps—from No. 0 to 2" diameter. All three methods of holding the tap are available: on the shank, on the O.D. of thread, and on centers. Also countersinks, 3- and 4-flute drills and reamers, engravers' bits, router bits and many other tools requiring relief on the point can be ground accurately and quickly on this versatile grinder.

Send us the handy coupon for complete details.

EDWARD BLAKE COMPANY A.M.
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Please send me complete details on Blake Tap Grinders.

NAME _____ TITLE _____
COMPANY _____
STREET _____
CITY _____ STATE _____

BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION DRILL GRINDERS—WALTHAM CUTTER SHARPENERS

An Event To Be Remembered

When H & G goes to work for you

YOU will always remember the day you change to H & G Insert Chaser Die Heads. Your threaded parts production picture undergoes a complete transformation. As you walk by the machines you will see

— IDLE men at BUSY automatics.

— NOT BUSY men at IDLE automatics.

The former spells PRODUCTION . . . PROFIT; the latter spells NON-PRODUCTION . . . LOSS.

Based on a recent impartial survey, screw machine experts voted H & G Insert Chaser Die Heads their *number one choice.*

A DAYTON man gives this reason: *"Holds size better. Threads straight and true."* A NEW HAVEN man says: *"Accuracy, performance, economy."* A man in HARTFORD writes, *"More threads per grind."* From CINCINNATI *comes this: "For close to shoulder threading."* From SAN DIEGO a leading screw machine parts producer writes: *"Interchangeability of chasers for different styles of die heads."* A manufacturer in WORCESTER says: *"Low price chasers . . . Quick to set. Uniform high quality threads."*

Simple Strong Accurate

Sizes and Styles for all machines on which threads are cut

H & G Insert Chaser DIE HEADS

LITERATURE ON REQUEST

THE EASTERN MACHINE SCREW CORPORATION

Manufacturers of H & G DIE HEADS • THREADED RODS • SCREW MACHINE PRODUCTS

20-40 BARCLAY STREET, NEW HAVEN, CONN.

You Can Draw More than Beer

from these STAINLESS STEEL BARRELS...

STAINLESS STEEL SIMPLIFIES PRODUCTION . . . The high ductility of "18-8" makes severe drawing operations easy. Here, one man places a stainless steel blank in the press, while the other stacks a stamping.

COMPONENT PARTS OF BARRELS ON WAY TO WELDERS . . . Tops, shown at left, bottoms, at center, and middle sections, on upper right, move on huge conveyor belts to welding department, to be joined together into a finished Firestone product.

● **Yes, you can draw the mighty valuable conclusions that . . .** "18-8" stainless steel not only responds readily to forming operations, but also permits ready fabrication by welding.

The high ductility of "18-8" assures three basic advantages: it makes deep drawing easy, it results in more uniform draws, and it enables forming a wide variety of shapes with minimum rejects.

Moreover, "18-8" chromium-Nickel stainless steel helps you cut bulk and deadweight from a product without sacrificing its strength or durability. For example, long-lasting, stainless steel barrels produced by Firestone Steel Products Division of the Firestone Tire & Rubber Company weigh only 28 pounds each . . . as against 75 pounds for a standard wooden barrel, and 45 pounds for a carbon steel barrel of equal capacity.

Leading steel companies produce stainless steel containing Nickel in tubular, sheet and strip form. A list of the sources of supply will be furnished on request.

EMBLEM OF INCO SERVICE
TRADE MARK

● Over the years, International Nickel has accumulated a fund of useful information on the selection, fabrication, treatment and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes and other alloys containing Nickel. This information and data are yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

THE WAVY SET BLADE

by MILFORD is back again!

Here is a band saw blade of unique design which, on horizontal band saw machines such as Wells, Johnson and Kalamazoo, and on all vertical cut-off machines, will . . .

- • • **increase blade life an average of 30%***
- • • **positively eliminate ripping of teeth**
- • • **cut with greater precision and closer tolerances**

* from actual reports of current users

Originated by MILFORD and discontinued in the interests of standardization during the war. The efficiency of this blade, however, has been so thoroughly demonstrated on the horizontal type of machines now extensively in use, that the 3/4" 10 and 12-tooth wavy set sizes have been added to the standard list and are available for immediate shipment.

Your own machines are your best proving ground. Test a MILFORD WAVY SET BLADE against the field!

Order from your Mill Supply Distributor. He is always ready to serve your needs for all factory and mill supplies as well as MILFORD hack saw and band saw blades.

MILFORD
PROFILE AND BAND SAW BLADES
RESISTOR AND DUPLEX HACK SAW BLADES

THE HENRY G. THOMPSON & SON CO.
Saw Specialists Exclusively for Over 65 Years
NEW HAVEN 5, CONNECTICUT, U. S. A.

Available Again

"MILLING CUTTERS and HOW TO USE THEM"

An authoritative presentation on a subject of vital interest to every machine shop supervisor.

This handy booklet, originally a series of 12 illustrated articles which appeared in *American Machinist*, is available again. Original demand for this practical, helpful working guide to the use of milling cutters was so heavy that we have reprinted the series and bound them in a convenient 36-page booklet for your use.

Completely covering the operation of milling cutters, this series treats many specific problems, including the use of cutter materials; heat-treatment in developing cutting properties; direction of cut; rake, clearance and relief angles; sharpening cutters; grinding wheels. Diagrams and tables add to the practical value of this reprint as a handy reference.

Supply is limited, so if you need more than 25 copies better order now.

The convenient coupon below will bring you any reasonable quantity at

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Please send me..... copies of "Milling Cutters and How to Use Them" at 50c each. I enclose $..... (Check, money order, stamps.)

Title .....

Name .....

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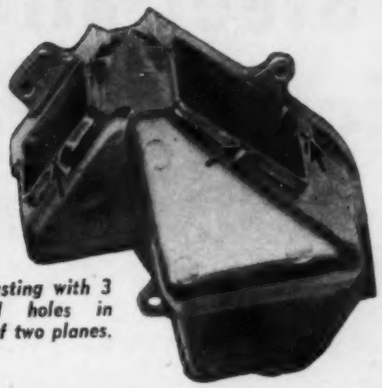
IF YOU DRILL OR TAP SMALL PARTS LIKE THESE . . .

Die casting with 8 multiple-reamed holes.

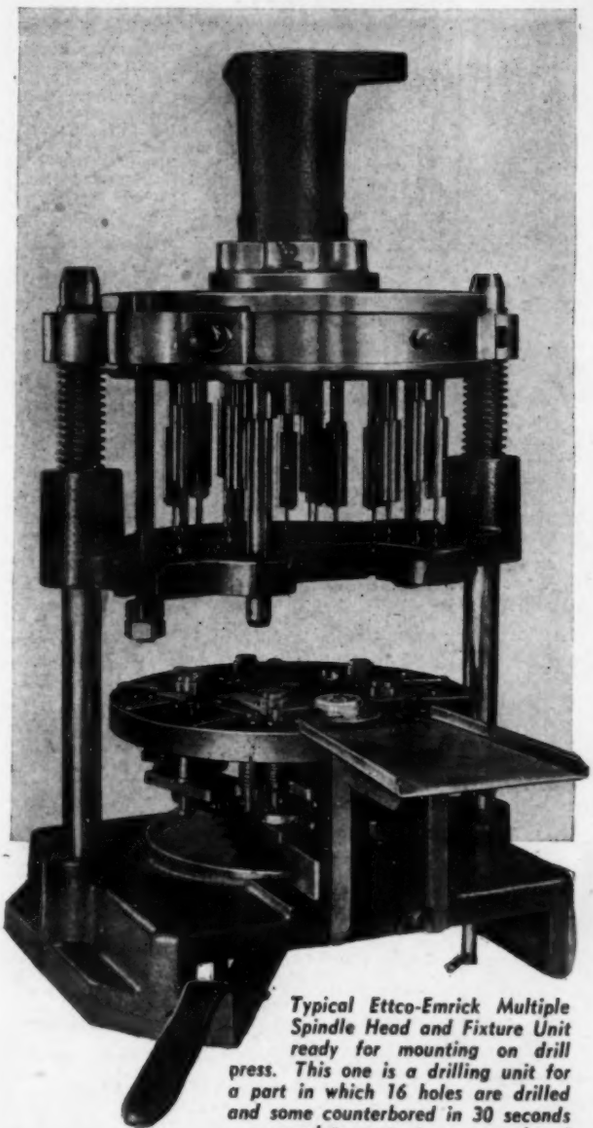


Die casting with 3 tapped holes in each of two planes.

Part with 54 drilled holes and some counterbored

(Right) 18 drilling, 27 countersinking, 3 counterboring, and 12 tapping operations on this aluminum cover and body (not shown) are done in 90 seconds.

Part with 15 holes drilled and some reamed and counterbored.



Typical Ettco-Emrick Multiple Spindle Head and Fixture Unit ready for mounting on drill press. This one is a drilling unit for a part in which 16 holes are drilled and some counterbored in 30 seconds —a complete part at every stroke of the press.

...get the production you need at low cost—with

Ettco-Emrick

MULTIPLE HEADS

The Ettco-Emrick Multiple Head System is the result of 30 years specialization in small parts drilling and tapping. It provides, not just a multiple spindle head, but a complete engineered unit, including a work holding fixture that makes feeding a particular part as well as its drilling or tapping, a quick, easy operation—readily performed by unskilled labor. Because Ettco-Emrick units are made of standardized parts their cost is low —and you get it back in quick time by savings in labor and machine hours.

BULLETIN No. 31 gives the full story—with many actual examples.

Write for a copy today.

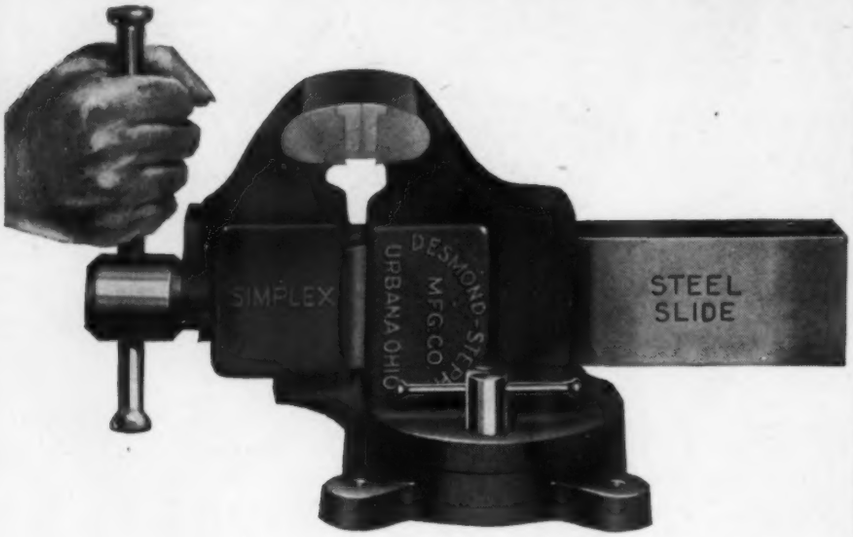
ETTCO TOOL CO.

590 Johnson Avenue, Brooklyn 6, N. Y.

Boston, Mass. — Portland, Conn. — Detroit, Mich. — Chicago, Ill.

OTHER ETTCO-EMRICK PRODUCTS — KEYLESS DRILL CHUCKS — TAP CHUCKS — TAPPING ATTACHMENTS

Exclusive Steel Slide construction assures



longest service

Only Desmond Simplex Vises have the solid steel slide that makes them far stronger and more serviceable than ordinary iron slide vises. Moreover, Desmond gives you this extra "mechanical advantage" in a complete line: machinists', combination pipe, welders', filers', drill press and milling machine, utility or garage, and woodworkers' vises. All Desmond products—including grinding wheel dressers and cutters for all requirements—are available through leading industrial supply distributors.

Write for complete catalog,

The Desmond-Stephan Mfg. Co. • Urbana, Ohio

Desmond

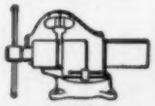
SIMPLEX STEEL SLIDE VISES

BALL BEARING DRESSERS

REVOLVING CUTTER TYPE DRESSERS

DIAMOND HAND TOOLS AND NIBS

WHEEL TYPE DRESSERS



SIMPLEX STEEL-SLIDE VISES

SCHERR aids to precision – production

Control the Job From Start to Finish with the WILDER PROJECTOR

New horizontal type for production inspection just out.

Throws a magnified shadow image of the part under inspection against an enlarged drawing of part. Magnifications available, 10x to 200x. Horizontal work table for flat work. Center support and micrometer cross slides for checking forming tools, screw threads, hobs, etc. Eliminates all errors due to "feel." May be speedily operated, with little or no experience. Prevents costly errors and insures initial correctness from the start of a production run. THIS COMPARATOR can be equipped with a new circular type of Surface Illuminator.

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An invaluable inspection tool, because it magnifies the work under inspection, floodlights it as well, and gives the immense advantage of "two-eye seeing." No wonder thousands of Magni-Rays are serving in large inspection departments, and other thousands on precision machines or critical toolroom operations. The lens is ground by experts for true magnification. Heavy base permits swinging lens to any position any height to 14 in. Three types—Model A, 3" lens, 1½x plus. Model B, 3x plus. Model C, 5" lens, 1½x plus.

GAERTNER TOOLMAKERS' MICROSCOPE

For rapid precision checking of critical dimensions, angles, contours, etc. A scientific instrument with the rugged strength of a manufacturing tool. Valuable in both tool room and inspection department and absolutely required for thread inspection. You can see that last ten-thousandth with the Gaertner. You can instantly spot the slightest deviation from correct angle. All eyes see it alike, too—no arguments. Any toolmaker can use it. Wide range of templets for use with the templet ocular head.

Save Time on Surface Grinders with SCHERR MAGNE-BLOX

When placed on magnetic chuck, these magnetism-conducting parallels and angle irons will firmly hold small pieces and irregular shaped work. *No need of special clamps or fixtures. THEY RETURN THEIR COST* many times over by quicker setups, more accurate results, less danger of distortion and bowing when grinding thin flat work. Made in many different sizes and shapes. Ask for catalog. *DON'T REGRIND YOUR MAGNETIC CHUCKS—BE WISE—USE MAGNE-BLOX—Special Offer:* Set consisting of 2 parallels 1 x 1¾ x 3¾ plus 2 V-blocks, hard brass and Swedish iron laminations in solid metal case $17.50. Money back if you can duplicate this value.

Write for full details on these tools, and for the Scherr Small Tool Catalog.

GEO. SCHERR CO., Inc.
200-D Lafayette St. New York 12, N. Y.

Write for Samples...
Yours for the Asking

TEST THE SPEED OF "SPEED CASE"

X1515 LOW CARBON OPEN HEARTH STEEL

ALSO PROVE TO YOURSELF THAT IT WILL DO ALL THESE THINGS...

1 Machine at 250 SFPM.

2 Carburize with better results than with C1019.

3 Reduce distortion at least 75%.

4 Increase tool life 2 to 5 times.

5 Bend or deform without fracture.

6 Replace "duplicating" analyses in your inventory.

SPEED TREAT STEEL
Medium High Carbon for Heat Treating

DO THIS . . . Pick out that "tough one" you have and ask us to show you how to "lick it" with Speed Case.

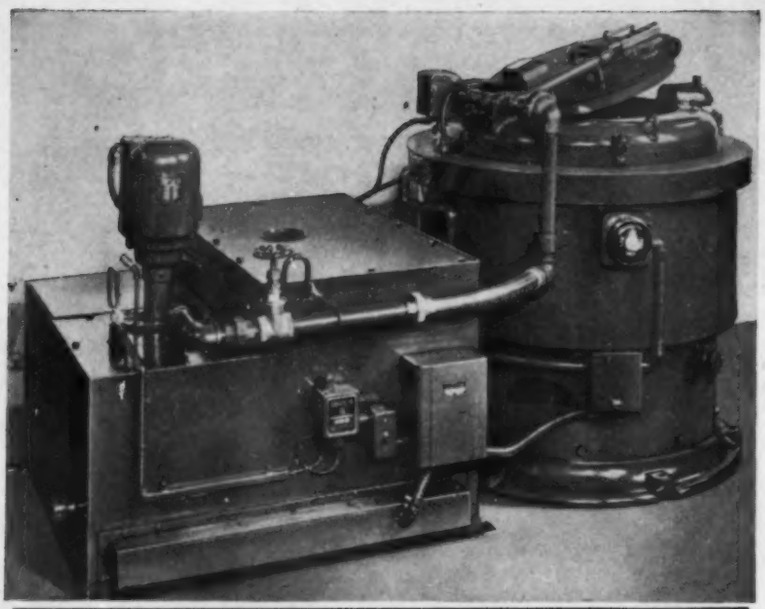
Tear off here ATTACH TO YOUR LETTERHEAD AND MAIL TO EITHER COMPANY BELOW

The FITZSIMONS STEEL COMPANY
Licensee for Eastern States
YOUNGSTOWN, OHIO

MANUFACTURERS OF A COMPLETE LINE OF COLD FINISHED CARBON AND ALLOY STEEL BARS

MONARCH STEEL COMPANY
Licensor
HAMMOND · INDIANAPOLIS · CHICAGO
PECKOVER'S LTD., Toronto, Canadian Distributor

ACTUAL PHOTOGRAPH
Speed Case Steel (.20 carbon) 1 inch cold drawn bar tied in a knot, cold, without fracture.



CONTROLLED IMPREGNATION by the BARRETT "HYDEWA" Centrifugal Process offers many advantages

The Centrifugal Process is limited in application only to the size of the articles that may be rotated in fair balance in the revolving bowl. Coils, condensers, transformers, braiding cotton, insulated wire, paper tubes, pressboard spacers, rawhide and bristles, are but a few of the many typical products now being processed in Barrett Impregnators. Many products heretofore considered impractical for satisfactory impregnation by other methods have been successfully handled.

The Barrett Method assures fast production, by reducing the customary hours to minutes, high penetration, with controlled impregnation, also positive expulsion of air from the articles being impregnated.

Basic units are self-contained, direct motor driven. Special arrangements and supplemental equipment also provided.

Submit your problem and samples for test and recommendations.

THE LEON J. BARRETT CO., WORCESTER, MASS.
Designers and Builders of Centrifugal Machinery

Permanent marking gives your products identity, adds impetus to their sales, helps their proper use, as well as serving many uses during production, assembly, and distribution. Marking is a vital link from raw material to ultimate use. Whatever your needs for marking, Noblewest makes the machines, tools, and dies to do the job faster, better, cheaper. Why not let Noblewest engineers analyze *your* marking requirements without obligation to you. *Write,* NOBLE & WESTBROOK MANUFACTURING CO., 17 Westbrook St., East Hartford 8, Conn.

MARK IT BEST WITH
NOBLEWEST
Hi-Speed Marking Machines

HALLOWELL

STEEL COLLARS
. . . tough, smooth, dependable

Fig. 1432 Pat'd

The precision-made "Hallowell" Steel Collar is an exquisitely finished, quality product. 3" Bore and under are made from Solid Bar . . . 3-1/16" Bore and over are made of Cast Iron. *Write for detailed information.*

"Hallowell" Products are sold entirely through Industrial Distributors.

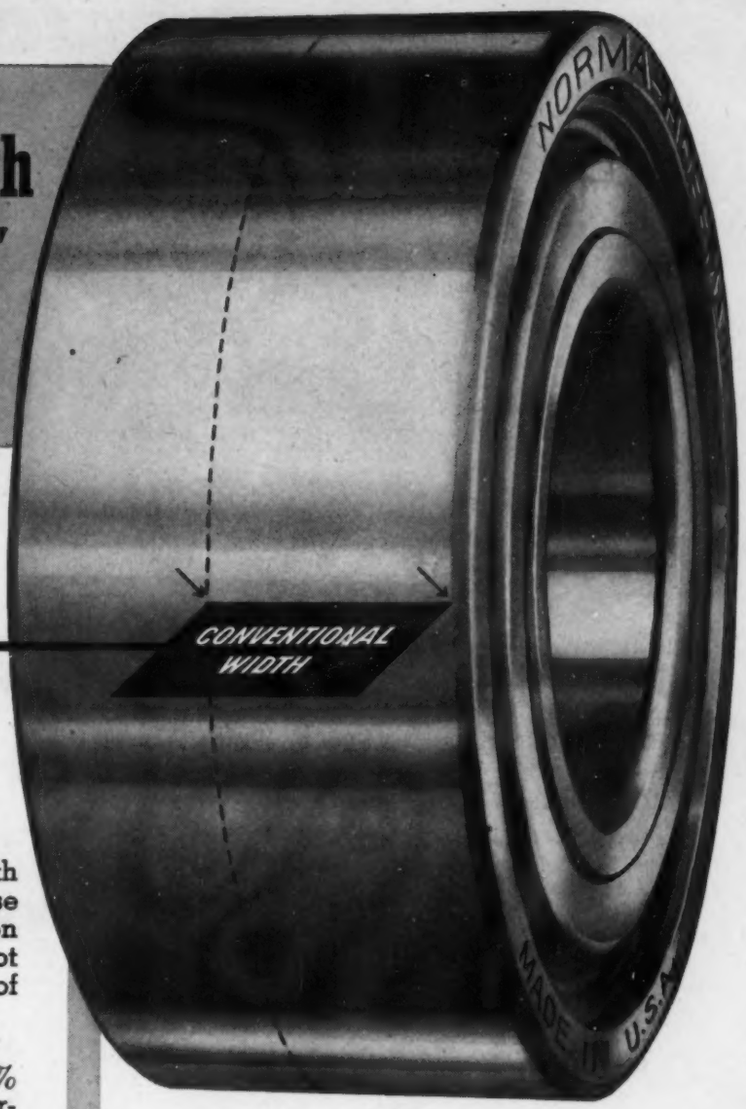
OVER 44 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.
JENKINTOWN, PA. BOX 4
BOSTON • CHICAGO • DETROIT • INDIANAPOLIS • ST. LOUIS • SAN FRANCISCO

"If it isn't Wide Enough It isn't Good Enough"

TO MEET TODAY'S PROBLEMS

This Extra Width "Cartridge" Bearing



PATENTED

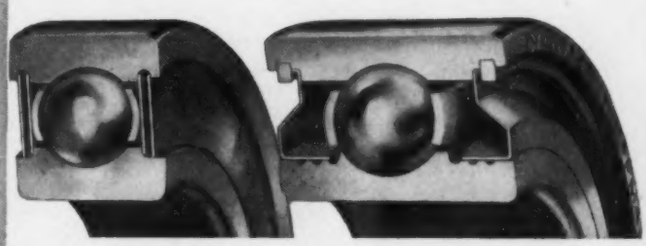
Gives You—

1. Longer Life Norma-Hoffmann Patented "Cartridge" Bearing has 100% greater grease capacity than conventional width sealed bearings. This means longer grease life... longer periods between relubrication ... because a large volume of grease does not oxidize or dry out as readily as a thin film of grease.

2. Greater Contact Area The 43% to 85% greater contact area between shaft and bearing bore and between housing and bearing O.D., as compared to conventional width bearing, eliminates need for locknuts. This results in greater shaft strength as it is unnecessary to cut threads for the locknuts. Slippage and peening are also prevented.

3. Full Load Carrying Capacity Unlike many sealed bearings, the Norma-Hoffmann "Cartridge" Bearing permits *full size* balls to be used; hence, there is no reduction in load carrying capacity.

Also available under license from Marlin Rockwell Corp., Jamestown, N. Y.



CONVENTIONAL Single Row Width sealed bearing has small grease capacity.

NORMA-HOFFMANN patented double row width "Cartridge" Bearing has 100% greater grease capacity.

America's No. 1 SEALED BEARING

NORMA-HOFFMANN "CARTRIDGE" BEARING

NORMA-HOFFMANN BEARINGS CORPORATION
STAMFORD, CONNECTICUT
FIELD OFFICES: New York, Chicago, Cleveland, Detroit, Pittsburgh, Cincinnati, Los Angeles, San Francisco, Seattle, Phoenix

YESTERDAY'S PIONEER • • • TODAY'S LEADER

WELDON

RADIUS CHARTS

for use with optical comparators

Weldon Radius charts are an essential aid to the efficiency of inspection and manufacturing departments. They are accurately laid out by means of a precision layout machine developed by Weldon engineers.

From the master charts, scribed on glass, the radius charts are carefully reproduced photographically on a translucent material of great dimensional stability. They are practically unbreakable, simple to handle and easy to clean.

Included with each set of five charts is a printed easy-to-read conversion table making computations unnecessary. The lines approximately .004" in width are in direct contact with the ground glass viewing screen, eliminating possibility of parallax.

SPECIAL COMPARATOR CHARTS. For inspection of special tools or, manufactured duplicate parts we are in position to make special charts of any form or forms.

Write for Folder RC 1

THE WELDON TOOL CO. Cleveland 4, Ohio

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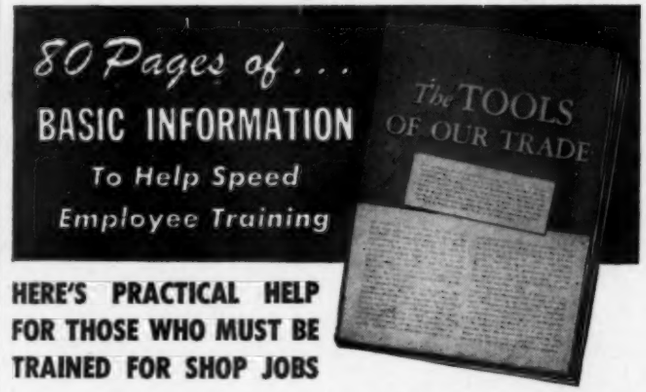

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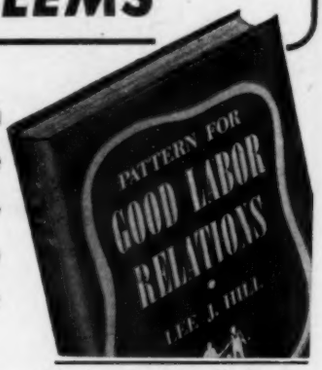

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SHAPERS — PLANERS

Fellows No. 6—36" Gear Shaper, motor dr.
24" American H.D., B.G. Crank Shaper. Motor drive 3/60/220/440
20x20x36 N.B.P. Shaper Planer
Whitcombe 24"x24"x6' Planer
1—New Haven, 12" Slotter (like new)
Gray 26"x26"x8' Planer
Betts 120"x72"x35' Metal working Double Housing Planer. Equipped with: 4 heads and power rapid traverse. With motor drive and controls, bed is 61' 3½" long

Pratt & Whitney 0" to 6" Vertical Shaper, swivel head on ram, rotary table—20" diam. Recently overhauled. Very good condition. Motor driven.

POWER PRESSES

2—#1A Standard Bench Type Press, ¾" stroke
#4 Bliss D. C. Forging Press
Bliss 68-C Double Action, three Crank Press
Hilles & Jones #4 Single End Punch and Shear. Equipped as Plate Shear with 18" Blades, AAR, motor drive, 48" throat
Bliss #76½B Single Crank Geared Press, 7" shaft, 3" stroke
Horton-Ackerly, Back Flywheel Bench Presses, ¾" & 1" stroke
Caldwell, 200 tons capacity, Hydraulic Horizontal Wheel Press
Lucas 15 ton Power Arbor Press
Bliss-Consolidated #163B S.S. Dble. Crank Press
Clearing, Crankless Press #F-1200-28, 200 stroke
Clearing, Crankless Press #F-1200-2B, 200 tons cap. Motor drive.

IN STOCK — IMMEDIATE DELIVERY

LATHES
8"x15" Sundstrand, Model C
8"x15" Sundstrand, Model D
10"x22" Sundstrand, Model AA
12"x18" Lipe Carbo, Motor Drive
14"x6' Hendey
18"x6' American Grd. Hd.
20"x10' Lodge & Shipley
22"x48" Centers Monarch (1942)
36"x30' Lodge & Shipley Triple Geared Selective Head, two carriages
50"x17'cc LeBlond Geared Head

MILLING MACHINES
No. 2-B Hvy. Brown & Sharpe Pl.
No. 2H Milwaukee Vert. (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Standard Milwaukee Vert.
No. 3 Cincinnati Vert. Dial Type
No. 3 Cincinnati Vert. High Power
No. 3K Milwaukee Vertical (1942)
24" Cincinnati Production
No. 2—18" Cin. Auto. R. and F. (1941)
No. 4—48" Cin. Hydro. Tracer Control (1942)
No. 5—48" Cin. Hydro. (1942)
No. 45—48" Cin. Hydro. Duplex Tracer (1943)
No. 56-90 Cin. Hydro. (1943)
No. 2 Hanson-Whitney Thread
4" Taylor & Fenn Spline, M.D.
24"x24"x12' Ingersoll Adj. Rail
54"x36"x10' Ingersoll Adjustable Rail
60"x48"x12' Ingersoll Adjustable Rail

DRILLS
No. 121 Baker, Motor Drive
No. 217 Baker—(1943)
No. D-8 Colburn No. 6 M. T.
No. 2 LMS—26"—1 Spdl. L-G (1944)
No. 2 LMS—20"—2 Spdl. L-G (1944)
No. 2 LMS—26"—2 Spdl. L-G (1945)
No. 2 LMS—20"—3 Spdl. L-G (1943)
No. 2 LMS—14"—4 Spdl. L-G
No. 4 BM—24"—4 Spdl. Fosdick
No. 2 LMS—26"—4 Spdl. L-G
No. 2LMS—26"—6 Spdl. L-G
No. 2—8 Spdl. Leland-Gifford
3'-11" Col. Cinn.-Gilbert
7'-15" Col. American Full Universal
7'-15" Col. Carlton, Motor on Arm

VERT. BOR. MILLS
34" King
36" Rogers
42" Bullard New Era
72" Cincinnati
72" Niles Extra Heavy
84" Betts

HOR. BOR. MILLS
No. 31—3" Bar Lucas
No. 360-F Giddings & Lewis (1942)
No. 560-F Giddings & Lewis (1942)

GEAR MACHINES
No. 7 Fellows Gear Shaper
11" Gleason Bevel Gear Cutter

PLANERS
36"x36"x12' Cincinnati, 4 Heads

MISCELLANEOUS
Model H-7 Micromatic Vert. Honer
2500 Ton Lake Erie Hydraulic Press

TURRET LATHES
No. 2 B. & S. Screw Machine, Wire Feed
No. 3 Jones & Lamson (1942)
No. 3 Warner & Swasey, bar feed (1940)
No. 4 Gisholt (1942)
No. 5 Warner & Swasey, air chucks (1941)
No. 5 Bardons & Oliver
No. 5 Foster, A.C. & Bar Feed
2-A Warner & Swasey
6R Denver
18" Libby, 3½" H.S.
No. 49-675—New Britain Gridley—7½" Cap.

GRINDERS
No. 49 Excello Carbide Tool Grd.
No. 5 B. & S. Plain (3" x 18")
4"x18" Landis Plain
6x18 Norton Type C Plain
6x30 Norton Type C Plain
10"x72" Colonial Broach Grd.
10"x24" Landis Universal
10x36 Norton Type C Plain
12"x36" Landis Univ. Type LCH (1945)
12"x48" Cincinnati Univ.
16"x72" Norton Type C Plain (1944)
No. 22—12" Heald Rotary Surface
No. 25-A—16" Heald Rot. Surf. (1943)
No. 34 Abrasive Surface Grdr.
16"x16"x48" Thompson Hyd. Surface
Norton Motor Driven Grinders, sizes 6x18 to 24x240

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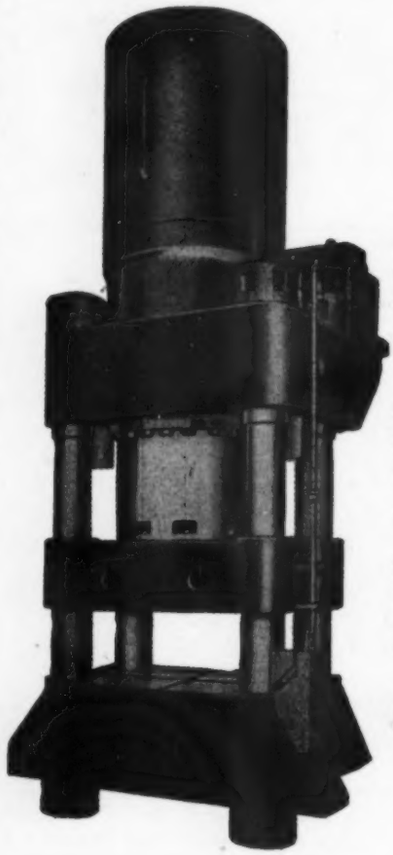

1300 TON WATSON STILLMAN HYDRAULIC PRESS Self Contained

Platen size 48" x 42". Stroke 22". Opening 37. Ram Diameter 35". Driven by 50 H.P. Motor, Also

600 TON ELMES PRESS

Self contained 48x45" between rods, 36" stroke, 66" openings, 75 H.P. motor, 3 phase, 60 cycle, 220v.

1320 TON PRESS, SELF CONTAINED

600 Ton Self Contained Lake Erie Double Action Press with 175 Ton Cushion Cylinder. Distance between rods 48"x60", Stroke 30", opening 48".

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Hand Reamers Sets ¼-1¼" x 32nds 33 Reamers in Box, $30.00 set

Expansion Reamer Sets ¼"-1½" 18 Reamers in Box, $40.00 set

H.S. Counterbore Sets, 13 Counterbores, ¼"-1", 17 Pilots, ⅛"-¾", 2 Holders, in Box, $25.00 set

#1-60 H.S. Drills, 60 Drills with Stand, $10.00 set

A-Z H.S. Drills, 26 Drills with Stand, $12.50 set

1/16"-½" HS Drills, 29 Drills with Stand, $13.50 set

HS Keyway Cutter Sets, 41 Keyway Cutters, Sizes #201 to G, ½" straight Shank, in Box, $75.00 set

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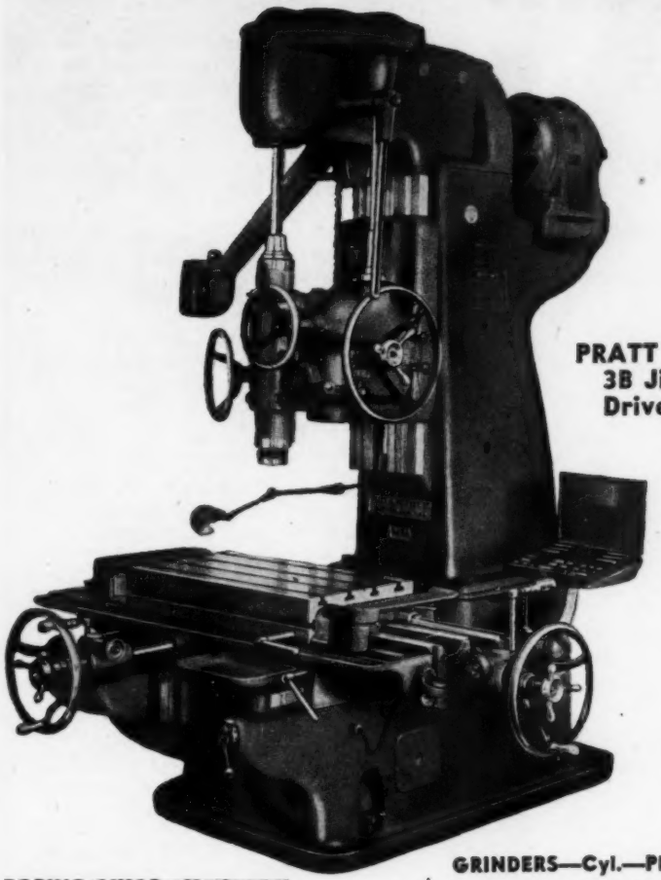
LATEST TYPE NEARLY NEW MACHINES



PRATT & WHITNEY 3B Jig Borer, Motor Drive, Latest Type

BORING MILLS—Horizontal

DETRICK & HARVEY 4", 5" bar, Floor Type
EXCELLO—Style 2112A—Jr., Latest Type
LANDIS #35, 3½" bar, Floor Type
GIDDINGS & LEWIS #32—3¼" bar, M.D.
NILES BEMENT POND 4½" Bar, Motor Drive
NILES BEMENT POND 5", 6", 7" bar, floor
OHIO 5T600—5" bar, Latest Type

BORING MILLS—Vertical

BETTS 120", 2 swivel heads, AC, M.D.
BETTS (Consolidated) 84"—3 heads, AC, Latest
BULLARD 36" N E Type Vert. Turret, M.D.
BULLARD 16", 6 Spindle Type D—Mult-au-matic, Latest Type
BULLARD 54" Maxi-mill, 2 swivel heads, M.D.
COLBURN 72"—2 swivel heads—A.C., M.D.
KING 36" Vertical Turret, M.D., Latest Type
NILES 62", 75", 100"—2 swivel heads, P.R.T., M.D.

BROACHES

LA POINTE #4L—35 ton, 68" stroke, Latest
LA POINTE—Vertical Surface, 25 ton, 66" stroke, Latest Type
LA POINTE—Vertical Surface—10 ton—54" stroke—Latest Type

DRILLS—Radial

AMERICAN 3'11" Hole Wizard—Latest Type
CARLTON 6'15", Ball Bearing—M.D.
WESTERN 5'18"; 6'20"—Latest Type

GEAR CUTTING EQUIPMENT

BROWN & SHARPE No. 3H gear cutter, M.D.
BARBER COLMAN #3 hobber, latest type
FELLOWS 64, #615A, 645A3, #7, 7A, 72, 75A, 77 High Speed Gear Shapers, latest type
GOULD & EBERHARDT #36H, with diff. M.D.
GLEASON 12" bevel generator, latest type
PRATT & WHITNEY 10" Grinder, hyd., latest
SCHUHARDT & SCHUTTE #1, #2 with Diff.—Motor Drive

GRINDERS—Cyl.—Plain & Univ.

BROWN & SHARPE #1, 2, 3, 4, Uni. Latest
BROWN & SHARPE #5 plain, 3"x12"—LATEST
CINCINNATI 6x18 plain Model EA, hyd., Latest type
LANDIS 4"x18"—Type H—LATEST TYPE
LANDIS 6x18 Type "C", Hyd., Latest Type
LANDIS 30x220" Centers, Plain, Motor Drive
NORTON 16x72" Plain Type "C" latest type
NORTON 16x72" Univ., Hyd., Type C, latest

GRINDERS—Misc.

BARBER-COLMAN #3 Hob Sharpener, Latest
CINCINNATI #2, 4 Centerless, Latest
HEALD 75A, 72A3, 72A5, 81 internal; plain, sizematic, gagematic, latest type

GRINDERS—Surface

ARTER 30" Rotary Surface—Hyd. latest type
BLANCHARD No. 16A—Dial Type—M.D.
BLANCHARD #27-18 M.D., Latest Type
BLANCHARD #16, 26" chuck, M.D.
BLANCHARD #11, 16" chuck, latest type
GALLMEYER & LIVINGSTON #35, 8x24" Hyd.
GALLMEYER & LIVINGSTON #55, 10x36" Hyd.
MATTISON 14x16x60 Hyd., Latest Type
NORTON 10x36 Hyd., Latest Type
NORTON 6x18 hyd., latest type
THOMPSON 16x30x48 Hyd., Latest Type
THOMPSON 8x12x24 Hyd., latest type

LATHES—Engine and Mfg.

BETTS BRIDGEFORD 60"x24' bed (raised to 84") Gearfed Head, M.D.
BRIDGEFORD 36"x28', 36"x32' bed—M.D.
HENDEY 12x30" centers, TIMKEN, latest type
JONES & LAMSON "Fay" 20x25" centers, TIMKEN latest type
LEBLOND 13"x4', 17"x5', 17"x14' bed, Rapid Production, Timken Bearing, latest type
LEHMANN 16x30" centers, hydratrol, TIMKEN, latest
LODGE & SHIPLEY 16/20"x30" centers, Timken
LOSWING 4x60, 4x84, 8x60, 8x108, 5x34" centers, latest type
MONARCH 36"x108" centers—Timken—LATEST TYPE
MONARCH 12"x30" centers—Timken—LATEST TYPE
NILES—42x60", double head, motor drive
NILES 48x35' Centers, Heavy Duty, 2 carriages, Timken Bearing, PRT, Latest Type
NILES 60"x10', 35', 40', Centers, Heavy Duty, Timken Bearing, 1 or 2 carriages, Latest Type
NILES 30x50' Boring, Timken, Latest Type
REED PRENTICE 24x20" bed, AC, M.D.
REED PRENTICE 20"x54" Centers, Timken, Latest
REED PRENTICE 24"x15', 20' centers, AC, M.D.
WARD HAGGAS & SMITH 18/36"x10' bed, Gap. Motor drive, Latest

LATHES—Turret

CINCINNATI ACME No. 1, No. 5W, Timken, latest
GISHOLT #3, 5, Univ., Timken, Latest
GISHOLT #1L, #2L, Universal, Timken, Latest
JONES & LAMSON #3, 7C, 8A, Univ., Timken, latest
LIBBY No. 1H-5 Timken Bearing—latest—5½" hole
MOREY No. 2G, No. 3, No. 4 Timken Bearing, latest
WARNER & SWASEY #5, Universal, Latest Type
WARNER & SWASEY #1A, 4A Univ., Timken, Latest
WARNER & SWASEY #3A, Univ., 6" hole, Bar or Chucking, Timken Bearing, latest type

MILLING MACHINES—Mfg.

CINCINNATI 3-24 Duplex, Hydromatic, Latest Type
INGERSOLL 32x24x16' Planer Type, 2 heads, AC, Motor Drive

MILLING MACHINES—Plain

BROWN & SHARPE #12, Timken, Latest Type
CINCINNATI—1-12, 2-24, Timken, Latest Type
CINCINNATI 4-36 Hydromatic, Latest Type
CINCINNATI #4, 4S, 5 Timken Bearing, M.D.
CINCINNATI #2, #3, Dial Type, Timken, Latest
KEARNEY & TRECKER, 1218, Simplex, Timken, Latest Type
KEMPSMITH 2 #4 Maximill, Timken Bearing, latest

MILLING MACHINES—Universal

AMES Bench, Timken, Latest Type
HARDINGE, Model UM, Timken, Latest Type
VAN NORMAN—#12, Timken, Latest Type

MILLING MACHINES—Vertical

CINCINNATI—2, 3, 4, Dial Type, Timken, Latest
CINCINNATI No. 3, No. 4 High-Powered, M.D.
REED PRENTICE #3VG, with or without Detroit Hyd, Univ. Duplicator, Timken Bearing, latest type

PLANERS

CHANDLER 36x36x20', 4 heads, AC, M.D.
DETRICK & HARVEY 48x48x16', 4 heads, Hyd.
DETRICK & HARVEY 84"x84"x18'—4 heads, DC, Motor Drive
GRAY 36x36x10', 2 hds., AC, M.D.
LIBERTY 24"x24"x66"—3 heads, Hyd., Latest
NILES BEMENT POND 48x48x16', 2 heads, AC
OHIO 42x42x20'—2 heads, AC, M.D.

SHAPERS

GOULD & EBERHARDT 24" High Duty, M.D.
LAMAIRE 18" Vert. Hydraulic—latest type
MOREY 8", 10", 12", 14" Vertical, latest type
MORTON—48"—Drawcut, M.D.

MISCELLANEOUS

BARNES 172, 249 Vertical Hone—Latest
DoALL—V36 Saw—Latest Type
FERRACUTE DG-55-75 Ton—Drawing Press—Tie Rod—17" stroke—Latest
LANDIS—1"—Bolt Threader—Latest Type
PRATT & WHITNEY KELLER Type G, Type BI, 2416—Latest Type

Available for Prompt Shipment ***Most Built After 1941***

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LATE TYPE MACHINE TOOLS

New — 1941-1945

Excellent Condition—Motor Driven

3½" Cincinnati Gilbert Floor Type Horizontal Boring Mill

#350OF 5" bar Giddings & Lewis Floor Type Horizontal Boring Mill

#26 Gleason Hypoid Gear Generator

12" x 16" x 36" Mattison Surface Grinder

#1 Brown & Sharpe Universal Grinder

#TG125 12" x 5" Jones & Lamson Auto. Internal Thread Grinder

#TG615 6 x 15" Jones & Lamson Auto. External Thread Grinder

#44 Waterbury Farrel DSSD Header

16" x 30" Springfield Geared Head Lathe

20" x 48" LeBlond Geared Head Lathe

27"x48" LeBlond Geared Head Lathe

36" Lehmann Hydratrol Geared Head Lathe

36" x 108" Centers Monarch Model NN Geared Head Lathe

48" x 20' centers Niles Geared Head Lathe

#2SP and #3SP Van Norman Plain Miller

#3 and #4 Cincinnati Plain Miller

#2MH Cincinnati Universal Miller

#2, #3, #4 Cincinnati Vertical Miller

#3H and #4H Milwaukee Vertical Miller

10" x 7" Bliss Rolling Mill

2⅝" Acme Gridley Model RS Six Spindle Auto. Screw Machine

#2, #3, #5, #4A Warner & Swasey Universal Geared Head Turret Lathes

#3 and #4 Gisholt Universal Geared Head Turret Lathes

#7A Jones & Lamson Universal Geared Head Turret Lathes

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UNUSUAL ITEMS

No. 5-60 Cincinnati Hydromatic miller with flywheel on spindle and 50 HP motor for carbide milling.

Three 2⅝" Acme Gridley 6 spindle automatics, model RA6, serial nos. 84448, 84263 and 84243.

No. HP50 Lapointe horizontal hydraulic broach with extension broach support. Capacity 25 tons, 72" stroke.

4¾" bar, No. 300 Giddings & Lewis floor type boring mill with 10'x10½' base plate outer support and 54"x72" rotating table.

96" Cincinnati; "Massive Pattern" vertical boring mill arranged for AC motor drive and having power rapid traverse.

Baker heavy duty drills. Sizes 121, 217, 217 three spindle, 310, 314 & 315.

34 spindle, No. 30 Natco multiple drill with 22" x 38" drilling area.

Twenty-one No. 12H Gould & Eberhardt heavy type universal gear hobbers.

Nos. 2 & 3 Cincinnati centerless grinders, late type with Filmatic bearings.

10"x96" Cincinnati type ER plain cylindrical grinder with Filmatic bearings. Brand new.

12"x16"x48" Thompson surface grinder with hydraulic traverse and hydraulic feed.

84"x48"x12' Liberty convertible openside planer with 2 rail and 1 side head, power rapid traverse, forced feed lubrication and variable voltage drive & MG set.

1000 ton, No. 666 Toledo knuckle joint coining or embossing press. 5" stroke, 32" between uprights, 29¾" shut height.

70 ton No. 4B23 Verson all steel straight side press permanently inclined. Has air cushion. 3½" stroke, 13" shut height, 23" between housings.

24"x96" centers Monarch model M engine lathe. Late type with flame hardened ways.

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RADIAL DRILLS
3'-9" Column American Hole Wizard, m.d., latest
3' American Sensitive, belt
4'-9" Column Cinn.-Bickford Super-Service, m.d., latest
4'-11" American Triple Purpose, m.d.
4' Niles-Bement-Pond Semi-Universal, m.d.
5'-13" American Triple Geared, gear box
5' Cincinnati-Bickford Plate Hole Driller, m.d.
5' Prentice Plain, motorized
6' American Triple Purpose, m.d. on base
6'-15" Carlton, gear box
6' Cincinnati-Bickford, m.d. on base
6' Niles-Bement-Pond Semi-Universal, m.d.
6'-16" Western, m.d.
8'-16" American Triple Purpose, m.d. on arm
10'-22" American Triple Purpose, m.d. on arm

UPRIGHT DRILLS
21" Cincinnati-Bickford, m.d.
30" Rich, m.d.
32" Aurora, belt
40" Aurora, belted m.d.
H3 Barnes Hydram, m.d.
D4 Colburn, m.d.
D8 Colburn, s.p.d.
No. 25 Foote-Burt, s.p.d.
No. 36HO Baker, H.D., m.d.
No. 262 Barnes All Geared, m.d., latest (3)

GEAR SHAPERS
No. 6, 61 Fellows, belt
No. 7, 7A, 71A Fellows, m.d.
No. 18 Fellows Finishing Machine, m.d.
No. 61A Fellows, m.d., latest
No. 64-S Fellows, m.d.
No. 615A Fellows, m.d., latest
No. 645A3 Fellows, m.d., latest

GEAR GRINDERS
No. 13LS Fellows Lapper, m.d.
10" P & W Hyd. Spur & Hel. Gear Grinders, m.d.
No. 2HS Lees-Bradner Spur & Hel. Gear Grinders, m.d.

GEAR HOBBERS
Type A Barber-Colman, m.d., latest (8)
No. 3 Precision Barber-Colman, m.d., latest (3)
Type T Barber-Colman, m.d., latest
No. 12 Barber-Colman Dbl. Overarm, long bed type
No. 34 Brown & Sharpe, m.d.
No. 44 Brown & Sharpe, m.d.
No. 36H Gould & Eberhardt, m.d.
48" Cleveland, m.d.
No. 96H Gould & Eberhardt, m.d.

GEAR CUTTERS
3 Spdl. Gould & Eberhardt No. 36BM Vert. Rougher
Gleason Spur Gear Testing Machine, m.d.
No. 1 Brown & Sharpe Spur Gear Tester
No. 3—26" Brown & Sharpe Spur Gear Cutter, m.d.
No. 6—60" Brown & Sharpe, m.d.
3" Gleason Straight Bevel, m.d.
8" Gleason Mfg. Type Straight Bevel, m.d.
11" Gleason Straight Bevel, m.d.
12" Gleason Straight Bevel, m.d.
Cincinnati Gear Burnisher, m.d.
Gleason Spiral Bevel Gear Rougher, s.p.d.
Cross Gear Tooth Rounder, m.d.

CENTERLESS GRINDERS
No. 2 Cincinnati, m.d.
Cincinnati Valve Seat Grinder, cap. 3/8" valve stems

CYLINDER GRINDERS
No. 50 Heald Hydraulic, m.d., brand new
No. 55 Heald, m.d.
No. 73 Heald Airplane Cylinder, m.d., new

TAPPING MACHINES
No. 1 Bakewell Precision, m.d., latest
No. 2 Bakewell Precision, m.d., latest
No. 5 Webster & Perks 5 spindle Vertical Nut, belt

PLAIN CYLINDRICAL GRINDERS
No. 5 Brown & Sharpe 3x18", m.d., latest
6x18" Landis, m.d.
6x18" Cincinnati Plain Hydraulic, m.d.
6x30" Cincinnati Hydraulic, m.d., latest
6x32" Fitchburg Type A, m.d., latest
8x18" Cincinnati Saddle Type, m.d.
8x36" Cincinnati Saddle Type, m.d.
No. 10 and 11 Brown & Sharpe, m.d.
10x24" and 10x72" Landis Self-Contained, m.d.
10x36" Cincinnati Hydraulic, m.d.
10x48" Landis Type C Hydraulic, m.d., latest
12x36" and 12x96" Landis Self-Contained, m.d.
14x48" and 14x72" Cincinnati Self-Contained, m.d.
14x52" Norton, motorized
20x120" Landis Self-Contained, m.d.
26x96" Landis Self-Contained, m.d.

AUTOMATICS
4 spindle 7/8" Cleveland Model M, bar
4 spindle 2" Cleveland Model M, bar
4 spindle 2¼" Cleveland Model K, bar
2¼" Cleveland Model A, bar
2¼" Gridley, bar, d.c. motor
2½" Cleveland Model A, bar
4¼" Cleveland Model A, bar
4½" Cleveland Model A, bar
5½" Cleveland Model A, bar
6" Cleveland Model A, bar
7¾" Cleveland Model A, m.d.
No. 4D Potter & Johnston, m.d., late
No. 5D Potter & Johnston, m.d., latest
No. 6A Potter & Johnston, m.d.
No. 6C Potter & Johnston, m.d.
14" Fay, m.d., Flanders Type
20x25" Jones & Lamson, m.d., latest

MULTIPLE SPINDLE DRILLS
No. 3 Baush, 16x30" head, 15 spindles
D13H Natco Hydraulic, 18x12" head, 10 spindles
2 spindle No. 262 Barnes Self-Oiling, Latest (2)
3 spindle 12" Rockford Gang, m.d.
4 spindle 21" Cincinnati-Bickford, m.d.
4 spindle Foote-Burt Rail, m.d.
No. 16 Fixed Center Foote-Burt Rail, m.d.

HORIZONTAL BORING MILLS
2½" Cleveland, m.d.
2½" No. 21 Lucas, m.d.
3" No. 31 Lucas, m.d.
3½" No. 32 Lucas, m.d.
4½" No. 33 Lucas, m.d.
4" Detrick & Harvey Floor Type, m.d.
4" Niles, belted m.d.
4½" Niles, belted m.d.
5½" Niles, m.d.
10" bar Sellers Floor Type, m.d.
Morton 60" stroke Boring Mill and Draw Cut Traveling Head Planer, m.d.

VERTICAL BORING MILLS
42" Bullard New Era, m.d., side hd.
24" Bullard Spiral Dr., side hd., m.d.
24" Bullard New Era, m.d., side hd.
36" Bullard New Era, m.d., side hd.
36" Bullard Spiral Dr., m.d., side hd.
42" Colburn H.D., m.d., 2 rail heads
48" Cincinnati Rapid Prod., m.d., 1 turret, 1 swivel head
48" Colburn H.D., 1 turret, 1 swivel head
53" Niles, m.d., 2 swivel heads
72" Cincinnati, m.d., 2 swivel heads
84" Niles H.D., m.d., 2 swivel heads
100" Niles H.D., m.d., 2 swivel heads

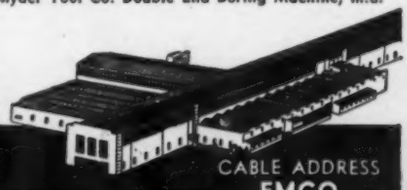
BROACHING MACHINES
Oil Gear Hydraulic type XA, m.d.
Colonial VAS-5-42, m.d., latest
No. 4 LaPointe, gear box
Cincinnati Mill Broach, 10" spindle, m.d.
No. 75 LaPointe Horiz. Hyd. 37½ tons cap., latest

BALL BEARING DRILLS
No. ½, 1, 2 Avey, belted m.d.
No. 1B Edlund, m.d., new
No. 2½ Allen, m.d., latest
No. 5M—16" Fosdick, m.d.
Providence Eng. Co., Model E
2 spindle No. 2 Avey MA6, latest
2 spindle No. 2 Avey, belted m.d.
2 spindle 21" Canedy-Otto, m.d.
3 spindle No. 2 Motor Avey type MA6, latest
3 spindle No. 3 Avey, with power feed and tapper
4 spindle No. 2 Avey, m.d.
4 spindle No. 2 Avey, p.f. and tapper
4 spindle No. 2 MA6 Avey, latest, p.f.
4 spindle Delta, m.d.
4 spindle Gardam, belt
6 spindle No. 3 Avey MA6, latest

BOLT THREADING MACHINES
¾" Economy Style R, Lanco Head
1¼" Landis, m.d., with Lanco Heads
3 spindle 1¼" Acme, belt

HORIZONTAL DRILLS
No. 1B—50" P & W Deep Hole, m.d., latest
No. ½Bx50" P & W Chambering Machine, m.d.
No. 1, 1½ Pratt & Whitney Deep Hole, belted m.d.
No. 1½x105" P & W Deep Hole, m.d., latest (6)
5 spindle Detroit Semi-Automatic, belt
No. 420—2 spdl. W. F. & John Barnes, m.d., latest
Pratt & Whitney Rifling Machine, belt
Snyder Tool Co. Double End Boring Machine, m.d.

THE ABOVE IS ONLY A PARTIAL LISTING. WRITE US YOUR NEEDS. LET US QUOTE.



THE EASTERN MACHINERY COMPANY
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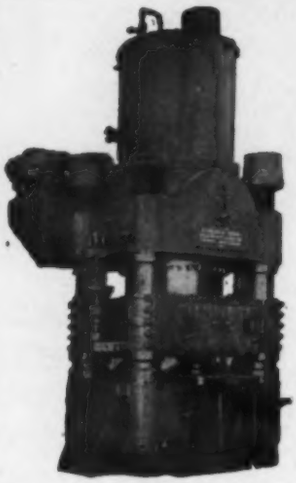

H.P.M. 2000 ton fast traverse, HYDRAULIC PRESS. Bed 46½" x 67½". Stroke 12". Shut height 20¾" with pumps, motor, and controls.

No. 45 GIDDINGS & LEWIS, table type, BORING MILL, 5" Bar.

84" GISHOLT VERTICAL BORING MILL.

72"x64"x14' INGERSOLL PLANER TYPE MILING MACHINE with 2 Vertical heads (1 head right angle) and 1 side head.

No. 5 REED-PRENTICE VERTICAL JIG MILLING MACHINE, table 68"x16", motor drive

10" x 168" PRATT & WHITNEY THREAD MILL

54"x18' HOUSTON STANWOOD GAMBLE Heavy Duty ENGINE LATHE with motor.

Wire — Write — Phone

EMERMAN MACHINERY CORP.

875 W. 120th STREET — CHICAGO 43, ILLINOIS

UNITED MACHINE TOOLS

2—2" GREENLEE—6 Spdl.—Automatic Screw Machines—MD—1942 Mfg.

DRILLS

4'9" CINCINNATI-BICKFORD Super-Service RADIAL—elec. column clam—2 speed motor—220-440/3/60—tapping attachment LATEST TYPE AND DESIGN—approx. 1943 Mfg.
3'11" CANEDY-OTTO RADIAL—LATE TYPE—motor on arm—220/3/60/1800 1942 Mfg.
#3MS LELAND-GIFFORD—3 spdle—12" BG—Power feeds on all spdles—LATE TYPE—4 speed motors 440/3/60—#3 MT
3'9" Avey Sensitive RADIAL—Belt Drive
21" CANEDY-OTTO—BG—Upright—#4 MT—220-440/3/60 PF to spdle. V-belt drive—NEW
16" SIPP—4 spdle—Sensitive—#2 MT—Belt Drive
16" ALLEN—4 spdle.—Sensitive—#2 MT—Belt Drive
16" CANEDY-OTTO—Floor & Bench—Sensitive—½" chucks—110/1/60—NEW

GRINDERS

#2 CINCINNATI — Centerless "Filmatic" — 220-440/3/60—thru feed work rest—infeed work rest and infeed attach.—LATEST TYPE—Approx. 1943 Mfg.
#2 CINCINNATI Hool & Cutter—220-440/3/60—Universal — large assortment of accessories — LATEST TYPE—Approx. 1941 Mfg.
#13 BROWN & SHARPE—Universal & Tool—220-440/3/60—LATE TYPE—with cabinet and extra attachments—1942 Mfg.
#TG-12 GRENBY — INTERNAL — High Speed —PF—LATE TYPE
10x48 MAJESTIC—Cylinder—220/3/60—mtzd. work head—mtzd. wheel head—pump—piping—LATE TYPE—1943 Mfg.
10x24 NORTON—Special—Cam Grinder—Mtzd.
9x18 MONARCH Surface—Hand Feed—Excello mtzd. spdle.—550/3/60—with chuck
#2 BROWN & SHARPE Surface—6x18—hand feed —MD—220-440/3/60—LATEST type and design —1943 Mfg.
#60 HEALD—Cylinder—motor driven—very clean—taken out of service.

LATHES AND TURRETS

16/20x58" LODGE & SHIPLEY—24 speeds—Selective Head—Taper Attachment—220-440/3/60—with extra equipment—LATEST TYPE AND DESIGN 1942 Mfg.
16"x6' SEBASTIAN—Type R-8 speed—Geared Head—Timkenized Spdle. 220-3-60—NEW.
20"x54" REED-PRENTICE — 16 speed — Geared Head—Tape Attach.—220-440/3/60—with additional equipment—LATEST TYPE AND DESIGN 1942 Mfg.
14"x6' SOUTH BEND—chucks—motor in base—1943 Mfg.
14"x30" LODGE & SHIPLEY—12 speed—motor in base—TA—chuck—stops 220/440—4 way tool post and other equipment—approx. 1941 Mfg.
#4 MOREY—Universal Turret—with bar feed, chuck, face plates, turret tools and numerous collets—LATEST TYPE & DESIGN—1943 Mfg.
#3 JONES & LAMSON—Universal Turret—220/3/60—with extras and bar feed—LATEST TYPE AND DESIGN—1943 Mfg.
#4 ACME Turret—Friction Head—Bar Feed—PF to turret—1½" cap.—Belt Drive
14x6 HENDEY—QCG—TA—chuck—collets—MD

MILLING MACHINES

#3K K&T "MILWAUKEE" Plain Horizontal — Power Rapid Traverse—220-440/3/60—motor in base—LATEST TYPE & DESIGN—1943 Mfg.
#2K K&T "MILWAUKEE" Plain Horizontal — Power Rapid Traverse—220/3/60 motor in base—LATEST TYPE & DESIGN—1943 Mfg.
#3 CINCINNATI—Plain Horizontal—power rapid traverse—dial type 220/3/60—LATEST TYPE & DESIGN—1942 Mfg.
#2B BROWN & SHARPE—Plain Horizontal—double overarm—dual controls 220/3/60—motor in base
#34 OHIO Universal—Belt drive—new dividing heads
#2I GARVIN—Belt drive—Plain Horizontal
#2MH CINCINNATI—Plain Horizontal—220/440/3/60—motor in base with arbor & Std. equipt.—1940 Mfg.

PRESSES

#DP53 FERRACUTE—40 ton—SS—motor driven—220/3/60—Plain—with side shear—1940 Mfg.
#10, #12 FAMCO—foot—on stand—NEW
#1, #2, #3 FAMCO—arbor—bench—NEW
#3K PERKINS—Screw—NEW

SAWS

#4C COCHRAN-BLY—Cold—inserted tooth blade —motor drive—220/3/60
6x6 L-W "TOLEDO" Power Hack—motor drive—cabinet model—NEW
8x16 KALAMAZOO Metal Cutting Band—110/1/60—motor and equipment with contour sawing attachment—NEW

SCREW MACHINES

#0G BROWN & SHARPE—fully automatic—vertical slide attach. serial number over 7000
#00G BROWN & SHARPE—fully automatic—serial number over 11,000 motor driven slotting attach.—swing stop and equip.—LATE TYPE
#0 BROWN & SHARPE—fully automatic—belt drive
#00G BROWN & SHARPE—fully automatic—serial number over 17,000 motor driven slotting attach.—swing stop and equip.—LATE TYPE
#00G BROWN & SHARPE—fully automatic—serial number over 14,000 motor driven slotting attach.—1943 Mfg.—Like New
#R4 NATIONAL ACME—4 spdle—fully automatic —3½" cap.—220-440/3/60 complete assortment of equipment—LATE TYPE

SHAPERS

16" GEMCO "LUBRIGARD" — 220/3/60 — power rapid traverse—front support heavy duty—plain—NEW
24" GOULD & EBERHARDT—crank—motor driven with 4-speed drive—Very clean
28" AMERICAN—back geared—all geared—power feed to head—SPD
7" LOGAN—floor type—110/1/60—NEW

SHEARS

36" PEXTO—Power Squaring—motor drive—16 gauge
42" WHITNEY—Power Squaring—16 gauge—motor 220/3/60—NEW

MISCELLANEOUS

DIE FILER—Thell #3—motor—220/3/60
DIE FILER—Harvey "Butterfly"—EL—110/1/60—NEW
GEAR CUTTER—Brown and Sharpe
PLANER—Woodward & Powell—48x48x20'—MD
PLANER—Whitcomb—24"x24"x6'—Arr. motor drive —less elec. equip.—1 rail head
SHEAR CUTTER—Williams & White 3"
PLANER—Woodward & Powell—60"x60"x12'—2 rail hds.—1 side hd.—box bed
HAMMER—Bliss—300#—board drop
CLUTCH CUTTERS—Waltham
PROFILER—Pratt & Whitney—#13—Gear driven
SUPERFINISHER—Foster

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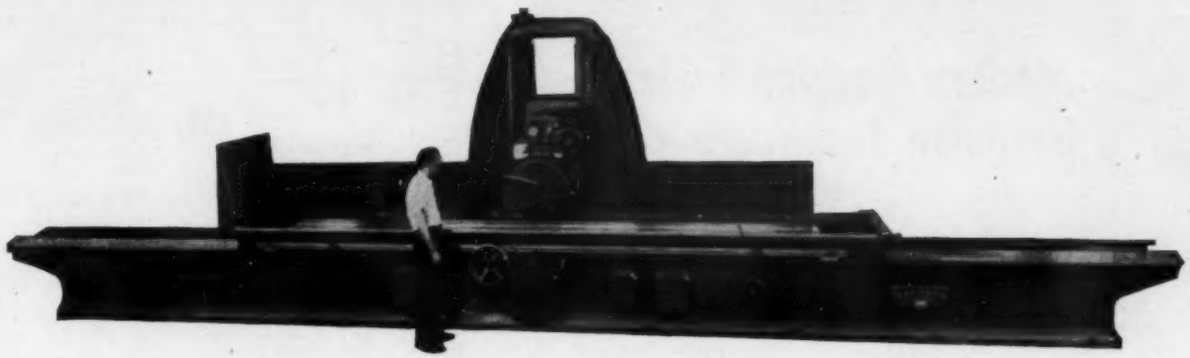

30" x 24" x 192" Mattison High-Powered Precision Surface Grinder, with hydraulic table feed and wheel cross feed, power raising and lowering device to wheel head with hand control for fine adjustment; equipped with 4 magnetic chucks size 30" x 48", motors and controls. Latest model. Also 14 x 16 x 60 Mattison and 10 x 12 x 25 Thompson Hydraulic Surface Grinders.

AUTOMATICS

9/16" RA-6 Acme-Gridley. New in 1943.
1" RA-6 Acme-Gridley. New in 1943.
2⅝" RA-6 Acme-Gridley. New in 1943.
1⅝"—8 spindle Conomatic. New in 1942.
5⅛" Cleveland Model A, single spindle.
16" x 33" Fay Automatic Lathe. New in 1941.

BORING MILLS

★ **No. 41 Lucas Horizontal Boring, Drilling and Milling Machine, with auxiliary high speed drive to give spindle speed of 1200 RPM; with star facing head, dial indicator indexing device, motor and control. New in 1941.**

BROACHES

No. 2SL LaPointe Hydraulic Horizontal. New in 1942.
No. CPC 8-24 LaPointe Hydraulic vertical. New in 1943.
No. CPC 5-36 LaPointe Hydraulic vertical. New in 1943.

DRILLS

★ **No. 26HO Baker Hydraulic, single spindle, 3" capacity in steel, with motor and control. Latest type.**
42" Cincinnati-Bickford, single spindle.
No. 1B Edlund Sensitive, single spindle. New in 1943.
No. 3 Avey, three spindle, heavy duty.
No. 3 Baush Multiple Spindle.
Barnes Horizontal Deep Hole, two spindle.
Taft Peirce Horizontal, double end.

GEAR CUTTERS

No. 22 Gleason Spiral, Hypoid and Zerol Gear Finisher. New in 1942.
25" Gleason Quenching Press.
No. 3616 Cleveland Rigidhobber. New in 1943.
No. 16H Gould & Eberhardt Universal Hobber. Latest type.
No. 7A, 7125A Fellows Gear Shapers.
No. 615A, 645A, Fellows Gear Shapers.
No. 3, 12 Barber Colman Hobbers.

GRINDERS

No. 2 Cincinnati Centerless, Filmatic spindle. New in 1941.
No. 3 Cincinnati Centerless.
14" x 48" Cincinnati Plain, Filmatic spindle.
10" x 36" Landis Hydraulic. New in 1943.
6" x 18" Cincinnati Hydraulic, Filmatic spindle. New in 1943.
No. 3 Brown & Sharpe Universal. New in 1943.
No. 13 Brown & Sharpe Universal and Tool.
★ **No. 36 Hanchett Vertical Rotary Surface Grinder, 36" chuck, 30 HP motor. New in 1943.**
No. 18 Blanchard, 30" chuck. New in 1942.
No. 75A Heald Internal. New in 1943.
No. 72-A-3 Heald Sizematic. New in 1943.
No. 16-16 Bryant Internal, Hydraulic, Used less than 2 years.

LATHES, ENGINE

Monarch Toolmakers 10" x 20" Model EE.
Pratt & Whitney Toolroom, 12" x 30". New in 1943.
Lodge & Shipley 16/20 x 48 (raised pattern). New in 1941.
Lodge & Shipley 20" x 48". New in 1943.
Monarch 24" x 84", helical gear.
LeBlonde 25" x 72", taper attachment.
★ **Bertram 28" x 240" "Timesaver", two carriages, with rapid traverse. Canadian made from Niles patterns. New in 1942.**
Lodge & Shipley 48" x 54", cone driven.
Hendey 16" x 6', yoke head.
Carroll Jamison 15" x 5', c.d.
South Bend 14½" x 6', c.d.
LO-Swing, IMP & LR.
Lipe Carbomatic, 15" x 30".
LeBlonde Production, 17" x 30".

LATHES, TURRET

Warner & Swasey No. 2A, preselector. New in 1945.
Warner & Swasey No. 1A, preselector. New in 1940.
Gisholt No. 1L, hydraulic speed selector. New in 1943.
Warner & Swasey No. 5 Universal. New in 1943.
Gisholt No. 5 Universal, Hydraulic speed selector. New in 1944.
Foster No. 5 Universal, Bar feed. New in 1943.
Warner & Swasey No. 4 Universal, preselector. New in 1943.
Gisholt No. 4 Universal, Hydraulic speed selector.
Warner & Swasey No. 3 Universal, two speed. New in 1942.
Bardons & Oliver No. 3 Universal, motor in base. New in 1941.
Warner & Swasey No. 2, oversize. New in 1942.
Bardons & Oliver No. 2, bar feed. New in 1941.
Brown & Sharpe No. 1, motor in base. New in 1941.
★ **Bullard New Era VTL, 36" x 42".**

MILLS

Van Norman No. 2SU Universal.
Gorton No. 9J Vertical, with tracer.
Cincinnati No. 5 High Power, Plain.
Milwaukee No. 4H Plain. New in 1942.
Cincinnati No. 2MH Plain, latest model.
Cincinnati Universal, No. 3, motor in base.
Hydrotel, Cincinnati Vertical 28" x 60".
Cincinnati Vertical, No. 4, H.S. Dial.
Cincinnati Vertical, No. 3, Med. S. Dial.
Milwaukee Vertical, No. 2H. New in 1942.
Hydromatic, Cincinnati Duplex No. 3-36.
Ingersoll, adjustable Rail, 36" x 12'.

MILLS, HAND:

Nichols, late type, speed to 1200.
Van Norman, latest model.
Whitney No. 6.
Standard No. 1.

MISCELLANEOUS

No. 7 Kling Punch, 1¼" through 1", 72" throat.
No. 8-6 Zeh & Hahneman S.S. Geared Press.
Pratt & Whitney Profiler, No. 12B.

PLANERS AND SHAPERS

Cincinnati Planer, 42 x 42 x 20, D.C.
American 20" & 24" Shaper.
Gould & Eberhardt 24" Shaper.
Cochrane & Bly No. 14 Vertical Shaper.
Pratt & Whitney 6" Vertical Shaper.

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Modern Machine Tools Ready to Ship
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DRILLS
Avey & Allen 3, 4, 5, & 6 Sp.
Cincinnati-Bickford 3', 4', 5', & 6' Radials
Carlton 4' Radial
Niles-Bement-Pond 6' Radial

GRINDERS
Abrasive Nos. 33 & 34; No. 3B
Gardner & Besly 53" Horizontal Disc
Norton 6"x18" Hyd. Surface
Norton 6"x10"x36" Surface
Norton 15"x15"x72" Surface
Hill-Acme 18"x18"x96" Surface
B. & S. Nos. 1, 2, 3 Universal
Mattison 12"x16"x54" Surface
B. & S. Nos. 5, 10, 11, Plain; #13
Norton 6x32, 10x24, 10x50 Plain
Bryant Nos. 3B, 5, 6, 12 Internal
Heald No. 70-A, Internal
Cincinnati No. 1½ Tool & Cutter
Norton No. 2 Tool & Cutter
Cincinnati No. 2 & No. 3 Centerless
Cincinnati No. 3 Centerless Lapper
Fitchburg 36" Spline Grinder
Blanchard No. 16—30"
Heald No. 25-A Rotary Surface
Heald Nos. 70A & 72A Internal
P. & W. 14" Vert. B.B.; also 22".

LATHES
Monarch 12"x30" CK (swings 18")
Hendey 14"x6' Y.H. Fact. M.D.
American 16"x6'—G.H.
Monarch 16"x8'—G.H.
Fitchburg 60"x22'

MILLERS
Milw. #2B Universal
Cin. #2 Universal
K & T #2HL & #4H Plain
Milw. No. 2B & 3B Double Overarm
B. & S. No. OY Production
Cin. Nos. 3, 4 Vert.
Becker Model C. Vertical
B. & S. No. 3B & 5B Plain
Kempsmith #2G Plain
Van Norman Duplex #0, #2, #10, #20
Rice-Barton 4" Spline
P. & W. 8", 10", & 12" Automatic
Cincinnati 18" & 24" Production
Sundstrand No. 00 and No. 2 Electromil
P. & W. 6x14 Thread
Lees-Bradner 6"x36" Thread
Cincinnati #5 M.D. Plain
K&T #2K, 3K Vertical

PRESSES
Bliss No. 1½ D.A. Toggle
1000 ton Toledo Knuckle Joint
WF 3000 ton Hydraulic
WF 157 Ton Vertical Hydraulic

SCREW MACHINES
B. & S. No. 00, 0, 2 Automatic
B. & S. No. 1 & 2 Hand Screw
Cleveland 1⅜" Model AA
W. & S. Nos. 1, 2, 2A, 3A Universal
W. & S. No. 5, Late
Foster No. 7 and No. 1B
Cone 1¼" 4 Spindle
Cleveland 3¾" Model A, Latest Type
Cone 3½"—4 Spindle
Cleveland 6¾" Model A
Cleveland 7¾" & 8" Model A
Gridley ⅞", 1¼, 1¾", & 2⅝", Model G; 3¼" & 4¼"
Cleveland 2½", Model K

MISCELLANEOUS
Boremetic—Heald No. 47-A
Boring Mill—Gisholt 30"
Boring Mill—Bullard 36" & 42" New Era

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National Bent Shank Nut Tappers—Battery of ⅝" and ⅞" Machines.
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1 National ½" to 1" Hot Bolt Head Trimmer
Woodward & Powell 42"x42"x36 ft. 4 Head Planer
Cincinnati 36"x36"x16 ft. Planer, M.D.
1 Lodge & Shipley 36" Swing by 44 ft. Bed, Selective Geared Q.C. Lathe, M.D.

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B4B NATCO 48-spdl. Holesteel Drill
3'-11" American Hole Wizard Radial
#12 Landis Centerless Grinder
16"x24"x72" Mattison Surface Grinder
6"x18" Norton "C" Hydraulic Grinder
6"x30" Norton "C" Hydraulic Grinder
#124B Kearney & Trecker SIMPLEX Miller
#3HS Cincinnati Vertical Miller
#2—#3—#4—#5 Warner & Swasey Universal Turret Lathes
#1 Brown & Sharpe Wire Feed Hand Screw Machines

ALL LATEST TYPE MACHINES

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Specials
P & W #2A Jig Borer, #3644
Cincinnati 375 Ton Press Brake—6½'x⅜
Clearing 90-10 Press Brake—10' 10 Ga.
Ryerson #4 Comb. Punch & Shear
Gorton Duplicators and Vert. Millers
Gorton No. 3Z engraving machines
B. & S. No. 2 Vert., Swivel Head
Doall Surface Grinder 8x24 Selectron
Marvel 6A Hacksaw, M.D., Auto. Feed
Injection Moulders, Hydraulic Presses

BORING MILLS
#0 Giddings & Lewis arr. M.D.
2½" Cleveland arr. M.D.
2½", 4" Binsee
Niles-Bement-Pond 4" duplex
Universal 3"
66" Niles; 54" Colburn M.D. 2 hds.
Bullard New Era 24", 42", Vert. M.D.

TURRET LATHES
W. & S. Nos. 3, 4 Grd. Hd., Preselector
Gisholt No. 1L, 2L Univ. M.D.
Foster Nos. 4, 5, 6, 1B, 3B M.D. Univ.
J. & L. 2¼"x24", 3¼"x36"
Acme #2 M.D.

GRINDERS
No. 34 Abrasive Vert. Surf. #3B, 8x24"
#25 Gallmeyer & Livingston Hyd. Surface
#25A Heald, M.D. like new Rotary Surf.
No. 2 Cincinnati Centerless M.D.
B. & S. No 2, 2B Surface, M.D.
P. & W. 14", B.B., Vert. Surface 19"x49"
Blanchard 30", M.D.; Modern 12x48" M.D.
Norton Hydraulic 12x18", M.D.
Heald No. 72A3 Gagematic
Norton 50"x28', M.D. Roll Grinder
Landis Type A 6x20" Hydraulic, M.D.
No. 55, 60, 65 Heald int., M.D.
12" Heald Rotary, Arter 12" M.D.
B. & S. No. 10 11 Cyl.; 1, 3 Univ.
Norton 6x18" Hyd. Surface, M.D.
Covel #91A Tool & Cutter

LATHES
Monarch Hendey 12x30, 10x20 G.H. Late
26x12' Boye & Emmes 3 step cone D.B.G.
14"x6' Hendey, Taper, Collets 16"x8'
9" LeBlond, P&W 1"x18" Automatic
36x30' Putnam M.D., 36x22', 42x16
32"x35' Wickes, M.D.
20"x30' Boye & Emmes Grd. Hd.
16x10' South Bend, late, M.D.

AUTOMATICS
Cleveland Model A ⅞", 1¼", 2"; B 1", 2"
⅞" Cone 4 spindle, Gridley
B & S #0, No. 2 Hand Screw
Brown & Sharpe 0G

New in Stock
Power Shears—52", 72" & 96"
Spot & Arc Welders
5, 7, 14, 18 & 30 ton OBI Power Presses
Ammco 7", Shape Rite 8" Shapers
H.S. Vertical Milling Heads
Drill Presses, Foot Presses
Kalamazoo Metal Band Saws
No. 1½ Abrasive Surface Grinder
6x6" Racine Hacksaw; #8 Marvel
20 ton Northern Hydraulic Presses

RADIALS
6' Cincinnati-Bickford
4' Fosdick 13" col., 8' Carlton, 19" col. M.D.
4', 5', 6' American Triple Purpose

MILLING MACHINES
Cleveland Vert. No. 1 M.D.; #1 Univ.
#12 #22L Van Norman, Duplex
#2B K & T Univ.; No. 2A B & S Univ.
No. 3S Cincinnati, S.P.D. rapid trav.
Nos. 0Y, 2, 3, 4, 5 B & S Plain & Univ.
Hall Planetary Model D Thread Miller
Becker Nos. 3, AB, 5, 6, Vert.
Nos. 2, 3, 4 Cincinnati Vert.
P. & W. No. 12, 30" Profiler, M.D.
B. & S. No 1, 3, Vert.
B & S #12 Elec. Prod. late type

MISCELLANEOUS
Oliver No. 510 Drill Pointer
Buffalo #0 Angle Roll M.D.
#20 Bliss OBI, #58-OB Gap Presses
6" Vertical Shaper, P & W
10x10 Peerless Universal Shaping Saw
#7, 72 Fellows Gear Shapers
Pexto 6' Power Shear
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PRACTICALLY NEW 2¼" CAPACITY SIX SPINDLE CON-O-MATIC

Complete with Threading Equipment and Large Amount of Collets, Pushers, Etc.

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PRACTICALLY NEW 2500 TON BIRDSBORO HYDRAULIC PRESS

Price $12,500.00

GIDDINGS & LEWIS FLOOR TYPE BORING MILL, MODEL No. 300, 4½" SPINDLE

New in 1933.

Price $6500.00

#4-A BROWN & SHARPE UNIVERSAL MILLING MACHINE

Single Pulley Drive and Motor.

Price $1750.00

PRACTICALLY NEW HEALD #47-A BOREMATIC

Price $1250.00

PRACTICALLY NEW AMERICAN VERTICAL BROACH MODEL V-2-6

Price $1750.00

LUCAS HORIZONTAL BORING MILL, 4" BAR

Motor Driven, About 20 Yrs. Old.

Price $2500.00

UNIVERSAL HORIZONTAL BORING MILL, 2½" BAR

Motor Driven, About 20 Yrs. Old.

Price $1750.00

NATCO 12 SPINDLE ADJUSTABLE DRILL PRESS

#3 Morse Taper, Motor Driven.

Price $1500.00

PRACTICALLY NEW STECHER DEEP HOLE DRILL

Price $1250.00

6' AMERICAN RADIAL DRILL, 15" COLUMN

#6 Morse Taper, Enclosed Head Type, Single Pulley Motor Drive.

Price $3500.00

(2) PRACTICALLY NEW MODEL #49 NEW BRITAIN-GRIDLEY AUTOMATIC CHUCKING MACHINES

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MONARCH 18" x 48" GEAR HEAD ENGINE LATHE, MODEL BB

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LATE MODELS OF MACHINE TOOLS FOR EARLY DELIVERY

BORING MILLS

42" BULLARD Vert., M.D. Spiral Drive
#360-F GIDDINGS & LEWIS, Floor Type, M.D.
#560-F GIDDINGS & LEWIS, Floor Type, M.D.
#44 UNIVERSAL Tri-Way, Table Type.

GRINDERS

#2 B & S Surface, M.D.
#2 REID Surface, M.D.
#10 B & S Tool & Cutter, M.D.
#72A3 HEALD Plain & Sizematic, M.D.
#4T SELLERS Tool Grinder, M.D.
9" P & W Hyd. Gear Grinder, M.D.
#5 B & S Plain Grinder, M.D.
#11 BLANCHARD Rotary, 16"x20" chucks.
8—#4H LANDIS 4"x12" & 4"x18" Plain Grinders, M.D.

LATHES

AMES Precision Bench Lathe, 1" Collet Cap., M.D.
14"x54" LODGE & SHIPLEY G.H. Lathe, M.D.
12" & 14" x 30' LODGE & SHIPLEY G.H. Lathe, M.D.
16"x30" MONARCH Mod. "C" Lathe, M.D.
16"x6' SEBASTIAN Lathe, M.D.
24"x108" centers MONARCH Mod. "N", M.D.
50"x17" centers LEBLOND "BIG SWING" Lathe, M.D.

MILLING MACHINES

#5/60 CINCINNATI, Duplex Hydromatic Milling Machine, tracer control mechanism for automatic rise & fall of spindle carriers, M.D., machine used six months.
#1G & 2G KEMPSMITH All Geared Univ., M.D.
#2H K & T Vert., Power Feed, M.D. (3)
#2MS CINCINNATI Dial Type, Plain, M.D.
#4MS CINCINNATI Dial Type, Plain, M.D.
#3HS CINCINNATI Dial Type, Vert., M.D.
#5H KEARNEY & TRECKER Plain, M.D.
#M-50A TAYLOR & FENN Vert., M.D.
#12-M MOREY 2-spdle PROFILER, M.D.

TURRET LATHES

#0G B & S Auto., M.D.
#0 B & S Wire Feed Screw Machines, M.D.
#2G Morey Ram Type, M.D.
#2 B & O Geared Elec., M.D.
#3 W & S Ram Type Univ., M.D.
#3 J & L Ram Type Univ., M.D.
#5 J & L Ram Type Univ., M.D.
#1A W & S Saddle Type Univ., M.D.
#2A W & S Saddle Type Univ., M.D.

MISCELLANEOUS

6'x48" THOMPSON Broach Grinder.
#36BM GOULD & EBERHARDT 3-spdle Gear Rougher
1½" Dble. Head LANDIS Thdg..Mach..M.D.
Used Bases for 4' & 6' CINCINNATI BICKFORD Radials

WIGGLESWORTH MACHINERY CO.
203 BENT STREET CAMBRIDGE, MASS.

FINE STANDARD TOOLS

LATHES

14"x6' HENDEY Tool room, Grd. Hd., taper, collets, M.D.
16"x10' HENDEY Grd. Hd., taper attachment, collets, M.D.
18"x10' L & S, selec. Grd. Hd., taper, M.D. (2)
24"x16' AMERICAN, 8 speed, Grd. Hd., taper, M.W. (2)
30"x11' AMERICAN 12 speed, Grd. Hd. M.D.
#4 WARNER & SWASEY Turret, latest type

SHAPERS

16" GOULD & EBERHARDT, Vee ram, M.D.
24" KELLY, heavy duty, M.D.

BORING MILLS

#32 LUCAS Precision Horiz. Boring Mill, table type 3¾" bar
#45 GIDDINGS & LEWIS Horiz. Boring Mill, table type 5" bar

O'CONNELL MACHINERY CO.
1825 Niagara St. Buffalo 7, N. Y.
DElaware 3400

Bor. Mill Hor. 3" G & L, M.D.
Boring Mills, 24"-36"-42"-52"-72"-96"
Drills, Radial 3'-4'-5'-6' Cin.-Bick.
Lathe, Turret 3-A W. & S., S.P.D.
Millers, Plain No. 3 K & T, No. 4 Cin.
Millers, Vertical No. 3 B & S & No. 4 Cin.
Profiler, #13 P. & W., B.D.
Shapers, 16"-20"-24"-36".
Shaper, 36" Morton Draw Cut.

West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

UNUSUAL VALUES

Milling Machines—#1, Universal, #1 American (new) plain, #1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe #3—26", Gould & Eberhardt 42".

Grinders—Cylinder, B & S #11, Planer type 16"x36", Surface 18"x62", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x6', 8', 10'—16"x6', 8', 10'—18"x6', 8', 10'—26"x16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized. Large stock 10" and 13" bench and floor type.

Planers—Single head 24"x6', 24"x8', 36"x8'.

Shapers—16", 20", 24", B.G. crank.

Turret Lathes— J & L 2"x24"—3"x36" also Asmo, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 30", 36", 40".

SPECIAL—New totally enclosed, dust proof, fan cooled, ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 3 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt #25—24" Hi Duty. 3" capacity in steel, motor attached.

PATTERN MAKING MACHINERY—42"x16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

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ENGINEERED REBUILT MACHINE TOOLS

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30" x 12' Boye Emmes G H
30" x 18' American G H
36"x28" Lodge & Shipley G H
60"x15' centers Niles G H

RADIAL DRILLS

3½' Cincinnati Bickford
4' Carlton, motor on arm
7' Carlton, motor on arm
8' American, motor on arm

MILLERS

No. 3 Cincinnati Universal
3-A B & S Universal
1-B Milwaukee Universal

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24" Bullard, New Era
62" N. B. P. 2 swivel heads
12' Betts 2 swivel heads
12' N.B.P. 2 swivel heads
16-24' Niles extension type
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150" Muir gear Hobber
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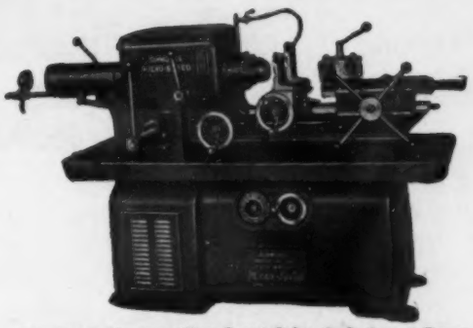

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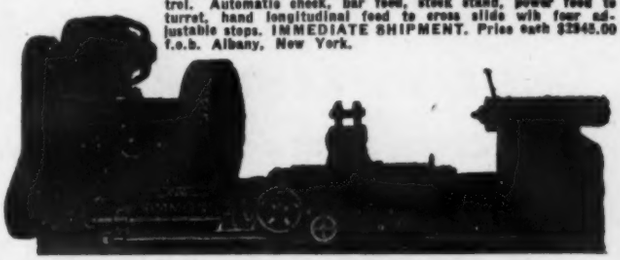

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#3 Waterbury Farrel punch press, capacity 20 ton, stroke 2½", ram adjustment, 60 strokes per minute, shut height, 6½", bed size F to B 10½", R to L 14½" $475.00

#6600 Waterbury Farrel punch press, cap. 56 ton, vertical back geared, open back, straight sided stroke 6", 60 strokes per min., 20" shut height, distance between uprights —46", bed size 10"x45", 5 HP motor, push button switches, V drive $1750.00

#13M Marshalltown throatless shear with circle shearing attachment for serpentine sheet metal steel shearing to 12 ga. with 1 HP motor 220/3/60 ..... $350.00

#104 Milwaukee portable jolt squeeze molding machine $275.00

Model RA-6, six-spindle Acme-Gridley automatic, 9/16" bar cap., including tooling and equipment, Serial #22377A, practically new $3950.00

Spot welder, 75 KVA gun type with air control, model SIDS5, serial #2801, Progressive $1250.00

3 ft. American radial drill, with motor $900.00

Bausch deep hole drilling machine, two spindle, max. depth 60", 5/8" drill capacity $372.00

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Cincinnati 375 ton, 8'8" overall, 6'6" bet. housings, 3½" cap.
Clearing #90-10, 12' overall, 10' bet. housings, 10 ga. New 1942. Also, #4 Ryerson Comb. Punch & Shear.

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1—Barber-Colman Model HRS Sharpening Machine, 1943
1—Norton 6"x18" Plain Hydraulic Feed Grinder

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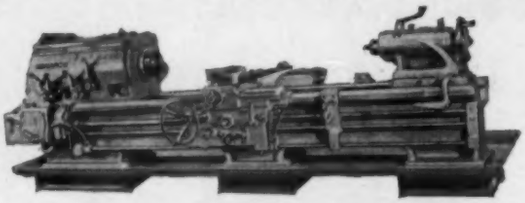

36" Monarch Lathe with Automatic Sizing Controls

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Pipe & Bolt Threading Machines up to 18", Injection Moulding & Die Casting Machines, Hammers: Board drop, forging, steam and air, Upsetters, Hydraulic & Power Presses, Turret Lathes, Engine Lathes, Radial Drills, Milling Machines, Shapers, Hacksaws, Planers, Grinders, Drill Presses, Vertical Boring Mills 24" to 32'.

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Hendey 12", 14", 16" and 18" Tool Room Lathes, M.D. 6', 8', 10' and beds.
1—Bradford 12"x6' Lathe, New, 12 speed, timk. bear., grd. bed., motor in base, latest type.

TURRET LATHES

2—Gisholt #3 Univ. Turret Lathes, sw. over bed 18½", hole thru spin. 1-7/16", 12 spin. speeds, 28-1460 RPM, bar feed, very latest type.
4—Bardons & Oliver #3 Univ. Turret Lathe, hole thru spin. 1⅞", sw. over bed 15⅝", 12 spin., spds., bar feed, very latest type.

UNIV. MILLERS

1—Van Norman #2 Duplex Miller, arr. for A.C., M.D.; tbl., wkg. surf. 41⅞"x9¾", power long. feed 28", cross 11", vert. 18"; spdle. speeds 6, range 30-280 RPM Attchmts.

MILL. MACHINES

1—Linley high speed Vert. Miller and Jig Borer, tbl. wkg. surf. 7"x17½", range, long. 10", cross 6", spin. speeds 8, range: 275—4250 RPM, late type.
1—Cin. No. 2MH Pl. Hor. (Late Type) Miller, 1200 RPM, tbl. wkg. surf. 49"x10½", long-range 28", cross 10", vert. 19".

RADIAL DRILLS

1—Cin. 3' 9" Col. Pl. Radial Drill, motor driven, 12 speeds, No. 4 Morse Taper.

GRINDERS

1—Cincinnati #2 Centerless Grinding Machine with Filmatic Bearings, latest type; cap. short wk. 1/16" to 3½", cap., bar wk. ⅛" to 2" diam. . . . 18' long with bar grinding fixture, grinding wheel max. diam. 20", max. width 8".
1—B. & S. 1, 2, 3 and 4 Univ. Cyl. Grinders, cap. 10"x20" (No. 1), 14"x30" (No. 2) 14"x40" (No. 3), 14"x60" (No. 4) very latest type.

SCREW MACHINES

1—Conomatic 8 spindle, full automatic, capa. 1⅞"x6" with elect. equip. and tooling, latest type, shipped from fcty. 1945.
2—New Britain—Gridley, Mod. 60 Full Automatics, capac. 1"x5", with AC elect. equip. and tooling, practically new.

HOR. BOR. MILLS

1—Giddings & Lewis #0 Hor. Boring Mill, knee type, diam. of bar 3½", 16 spin. speeds, max. dist. top of tbl. to cen. of spin. 26", cross feed 30", tbl. wkg. surf. 23¾"x45¾", dist. from spin. nose to outboard sup. 84", approx. wght. 9500 lbs.
1—Univ. #3-A Hor. Bor. Mill., diam. bar 3", No. 5 taper, rapid mill. feeds, size of tbl. 24"x48", cross feed to tbl. 36", dist. to outer sup. 60", vert. feed to hed. 26", wght. approx. 11,200 lbs. M.D.

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#4½ Bliss, 80-100 ton rated cap. 31x27 bed, 4½" stroke, with all accessories, latest design, 30, 88, 110 (optional) strokes per min.

#6 Bliss, 90-125 ton rated cap. 25x30 bed, avail. in 4½" and 5½" stroke, with all accessories, latest design, 30, 88, 110 (optional) strokes per min.

35 and 40 ton rated cap. Toledo Horning Presses, 2", 4½" stroke.

12' 3/8" and 10' ½" Power Press brakes.

Brand new 4½ ton OBI Presses, reduced to $165.00 ea. New 15 ton reduced to $363.00 ea.

10' ¾" 10'⅛" Power Squaring Shears.

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#2MH Cinci. Univ. Miller 1944
#3SP Van Norman Miller 1942
Nos. 2, 3, 4, Cinci. Vert. Miller '42, '45
#2, 3, 4 & 5 W. & S. Univ. &
#3 J. & L. Univ. Turret Lathes
#712 Fellows Gear Generator, 1942
36H & 48H G.&E. Gear Hobbers
30"x15' centers Amer. Super Pro. Lathe
18" raised to 24½" x 192" centers, BB
Model Monarch, Carr. P R T., '42

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30 Church St. N. Y. 7, N. Y.

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Jig Borer #3644 with equipt.
New 1945 — *Barely used.*

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4 lb. Double Inserted Face mfd. by Dance—Green Tweed or Equal, 2" diameter of face. $15.00 Doz.

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Model R, Seneca Falls Automatic Le-Swing Lathes
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Rigid Turner 8 sp.
Lees-Bradner Model 40 Thread Millers
Lapping Machines. Ultra Lap No. 20 (4)
Slab Miller 36"x14' Ingersoll
Engine Lathe, 32"x14' Alliance G.H.
Turret Lathes, Denver Acme Model G.2 (6)
Engine Lathe, 48"x32' Niles
Boring Mills—Vertical and Horizontal

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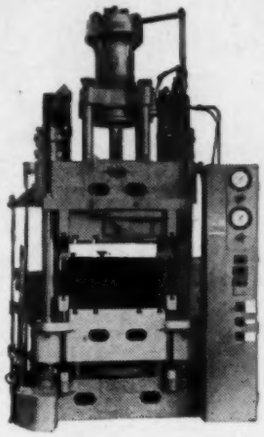

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The press may be operated either manually or on automatic cycles which permits the operator to determine the best method for molding a particular piece.

Specifications:

Capacity	300 tons
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Working space of platens	30"x32"
Transfer ram capacity	75 tons or alternately 100 tons maximum
Stripping devices, maximum stroke	6"

This press is now assembled and in operating condition in our plant, and we'll be glad to arrange for demonstration at any time. Write, wire or phone for appointment. *Complete descriptive information is available upon request.*

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Bullard 36"
Gisholt 44"

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Landis 16x36 Universal
Norton 12x36 Universal
Cincinnati 14x48 Universal
Cincinnati #3 Centerless
Rivett #104 Internal
Heald 72-A3 Plain Internal
Brown & Sharpe #2 Surf. Gr.
Covel #15 Surface Grinder
Covel #20 Surface Grinder
Thompson 8x24 Surf. Gr.
Thompson 25"x18"x72" Hyd. Surf. Gr.
Mattison 12x40x48 Surf. Grinder

LATHES

20"x10' Center Monarch
#4 Gisholt Turret Lathe

MILLING MACHINES

#2 Brown & Sharpe Universal Mill
#2HL Kearney-Trecker Horiz. Mill
#3K Kearney-Trecker Horiz. Mill
#3H Kearney-Trecker Horiz. Mill
#2K Kearney-Trecker Vertical Mill
#4H Kearney-Trecker Universal Mill

DRILLS

2 Spindle Edlund Drill Press
4 Spindle Edlund Drill Press
6 Spindle Edlund Drill Press
6 Spindle Allen Drill Press
5'x14" Column Amer. Triple Purpose Radial Drill

MISCELLANEOUS

#5 Reed Prentice Jig Borer
Grob W.S. 36" Band Saw
Keller—Model BL 2416 Die Sinker

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BOLT CUTTER, No. 22 Murchey, Dble. Hd.
BOR. MILLS, 2½" bar, Cleveland, M.D.
BORING MILLS, 3" bar Universal.
BORING MILL, Hor. 3½" Landis Floor Type.
BORING MILL, 36" Bullard, "New Era".
BORING MILL, 40" King, 2 heads, M.D.
BROACH, Vert. Hyd. SRV3-42" LaPointe. (1940)
DRILL, Hvy. Duty, No. 513 Baker, No. 6 M. T.
DRILL, Radial 8' Carlton, A.C. M.D.
GEAR SHAPER, #75 Fellows, M.D.
GRINDER, Internal, No. 72A5 Heald, 2 Mtr. Hyd.
GRINDER, Plain 14"x72" Norton
GRINDERS, Surf. Nos. 3 & 5 Abrasive
GRINDER, Surf. Hyd. G & L 14"x18"x72"—1942
GRINDER, Surface, No. 25 Heald Rotary
GRINDER, Univ. 12"x72" Cinci. Hyd.—1941
HAMMERS, Nazel Nos. 4-B and 6-B.
LATHE, 24"x16' B & E Grd. Hd.—1940
LATHE, 27"x18' Niles "Timesaver." Grd. Hd.
LATHE, 38"x19' Putnam, Grd. Hd. Q.C.G., T.A.
LATHE, 42"x50' Putnam, Grd. Hd.
LATHE, Tur. No. 3 W & S (Late)
MILLER, Duplex 24" Cincinnati, Auto.
MILLER, Plain No. 1½ Milwaukee, S.P.D.
MILLER, Plain, Nos. 3B, 4 & 5 Cincinnati.
MULT-AU-MATICS, Bullard Type A, 6 Spdle.
PRESS, No. S-153 Ferracute S.S., 150 ton, bed 42"x30", stroke 14".
PLANER, Openside, 36"x36"x12' Cleveland
SHEAR, Open End, No. 4 United, cap. 3½"

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CA-4 Ferracute Horn Press, 35 Ton Cap.
No. 44-P Toledo Horn Press, Arr. for Grd., M.D.
No. 16 Bliss Horn Press, Vee Belt, M.D.
Nylint Dbl. End Gage Grinder, M.D.
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No. 33 Abrasive Surface Grinder, M.D., Chuck & Rectifier
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12" x 10 Gage Ohl Press Brake

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One—Federal Machine & Welder Company 30 KW, 220 V., 60 cycle spot welding machine. Manufacturer's Serial No. 1372, Type 432P. Good condition.

REVERE COPPER AND BRASS INCORPORATED
Michigan Division
5851 W. Jefferson Avenue, Detroit 9, Michigan

FOR SALE — FIELD LATHE

6½" swing, 6 ft. centers, complete with attachments. Under power—quick change. *Priced to sell. Write, wire, or 'phone*

J. N. MITCHELL
68 E. Warren, Detroit 1, Mich. (TEmple 1-3034)

POWER SHEARS

96", 14 ga. cap.
72", 10 ga. cap.
52" & 72", 14 ga. cap.

Aaron Machinery Co., Inc.
45 CROSBY ST., N.Y.C. Tel. CAnal 6-0421

FOR SALE

Used 7 to 10 ft. Betts Vertical Boring Mill, Belt drive, two swivel heads, swing 126", maximum height under tool holder 58". Will be put out of service about November 1st. *Inspection invited. Write*

CLEARFIELD MACHINE COMPANY
Clearfield, Pa.

PRESS BRAKE

516-D Chicago Steel Press Brake has just become available; 135 tons capacity; 16 ft. 5-32 in. capacity or equivalent; few years old; perfect condition; priced right.

PRESS & SHEAR EXCHANGE, INC.
3800 Maple Ave. Dearborn, Mich.
CEdar — 9400

¾" x 10' Plate Shear—$8250.00
½" x 10' Power Press Brake—$4950.00
With electrical equipment, immediate delivery.

PAUL'S MACHINERY CO.
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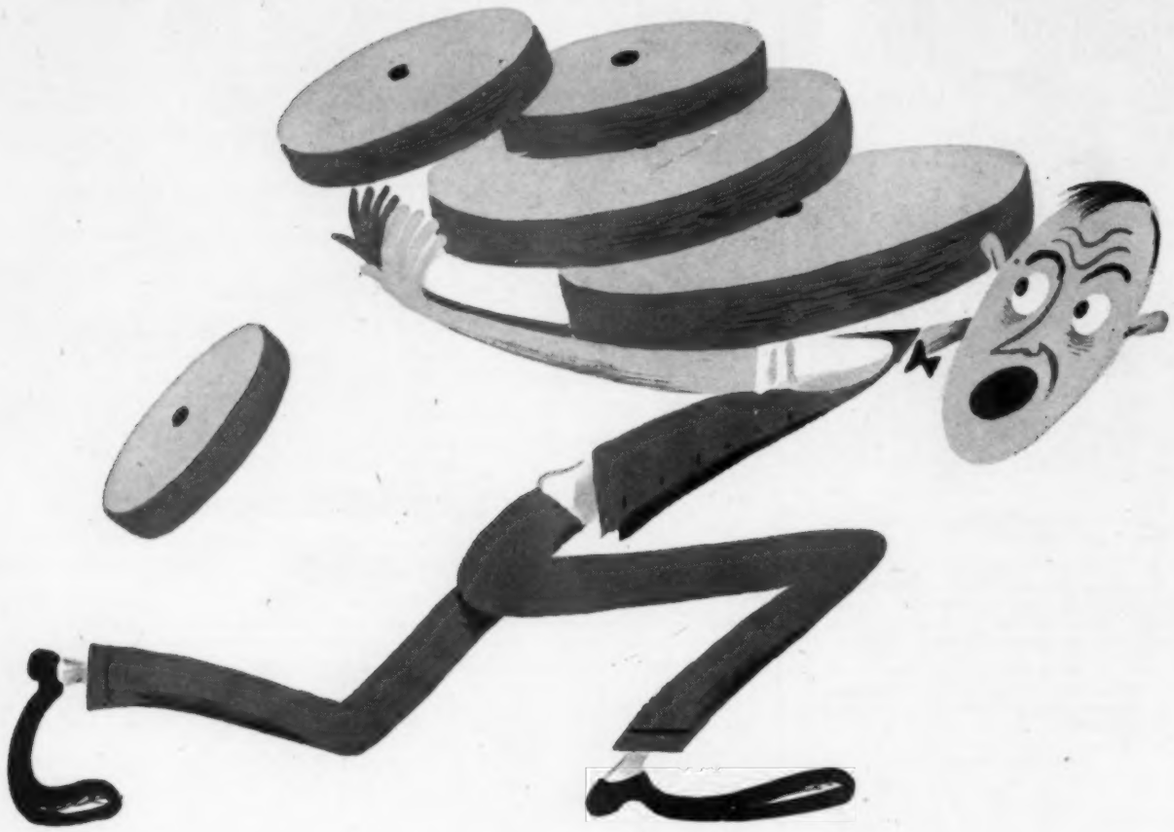
Tyler 7-6300

SALE—Automatic Screw Machine

1½" Conomatic 8 Spindle Screw Mch. new 1941; std. equipped, many extras, 20 HP, 220-440 3 phase, like new.

STRYKER MACHINE PRODUCTS CO.
481 Brunswick Ave., Trenton 8, New Jersey

Burdened down with "loaded" wheels?



... use a ROBERTSON COOL-CUT

MANY GRINDING WHEELS lose their effectiveness when they become "loaded," or filled in with bits of metal. A Robertson Cool-Cut Wheel, with its revolutionary open structure and its "clawing" action, uses only a few cutting grains at one time. The spaces in between are available for chip clearance. That is why a Robertson resists loading more than a conventional wheel. The results: cool cutting, even on the hardest metals—accurate, fast production—and lowered grinding-costs.

Hard to believe? Then take the experience of this manufacturing plant in Philadelphia: Grinding rivets from drop forgings on a centerless grinder, they were getting only 25 rivets per wheel-dressing, taking off 1/16" stock on a plunge cut. When a Robertson SA 54-QV wheel was substituted on the same job, production was increased to 125 rivets per wheel-dressing . . . an increase of 400%!

This is typical of the results reported by users of Robertson Cool-Cut Wheels. Whether you are doing surface grinding, internal grinding or cylindrical grinding . . . whether the material you are working is steel, cast-iron or bronze . . . you'll find that a Robertson Cool-Cut Wheel will substantially increase your production and at the same time lower your grinding costs.

ROBERTSON COOL-CUT

ROBERTSON MANUFACTURING COMPANY
TRENTON 5, NEW JERSEY

Manufacturers of Vitrified-Bonded Grinding Wheels • Mounted Wheels • Segments

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a pair of smooth operators

A pair of smooth operators, these Lovejoy Cutsall Milling Cutters are fast, free and easy in action. Designed especially for the most modern milling practices, Cutsall Cutters are big-bodied mills having rugged, tool-bit-type blades with extra large Carboloy Cemented Carbide tips.

The unusually large Carboloy insert allows deeper cuts, while adding considerably to blade life. Because they are built to run at high spindle speeds, continuously or intermittently, Lovejoy Cutsall Milling Cutters will remove the toughest stock at speeds you'll hardly believe —producing fine finishes of the closest accuracy.

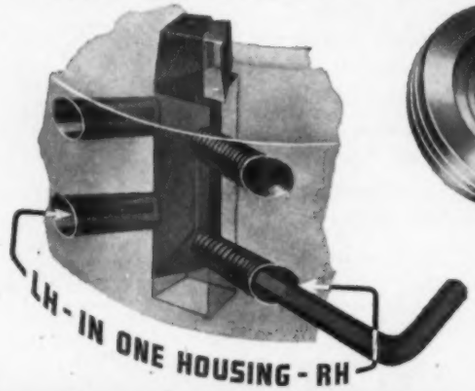
*THE LOVEJOY "CUTSALL" CARBOLOY TIPPED TOOL-BIT-TYPE FACE MILL

Lovejoy Cutsall Face and Step Mills have rigid, forged steel bodies designed to hold precisely and positively tool-bit-type blades. The blades, interchangeable among all sizes of Face and Step Mills for convenience and economy, can be ground easily to obtain positive or negative rake. In addition the blade design provides for fine individual adjustment and secure locking through two set screws in the housing.

Face mills are available in 6", 8", 10" and 12" sizes. Step Mills are available in same sizes as well as 4" dia. Both can be used for either right- or left-hand cutting.

For complete information on these powerful production tools, that will set new standards for speed and finish on your milling machines, send the coupon below. *Pat. Applied for

*THE LOVEJOY "CUTSALL" CARBOLOY TIPPED TOOL-BIT-TYPE STEP MILL



On most jobs, and always when cutting steel, the use of a flywheel is recommended to insure most effective use of the carbide-tipped blades. Lovejoy manufactures a complete line of flywheels and will be pleased to assist you in picking the proper size for your particular job.

LOVEJOY TOOL CO., INC.
SPRINGFIELD, VERMONT, U. S. A.

Please send me full details of:
( ) Lovejoy Cutsall Mills
( ) Lovejoy Flywheels

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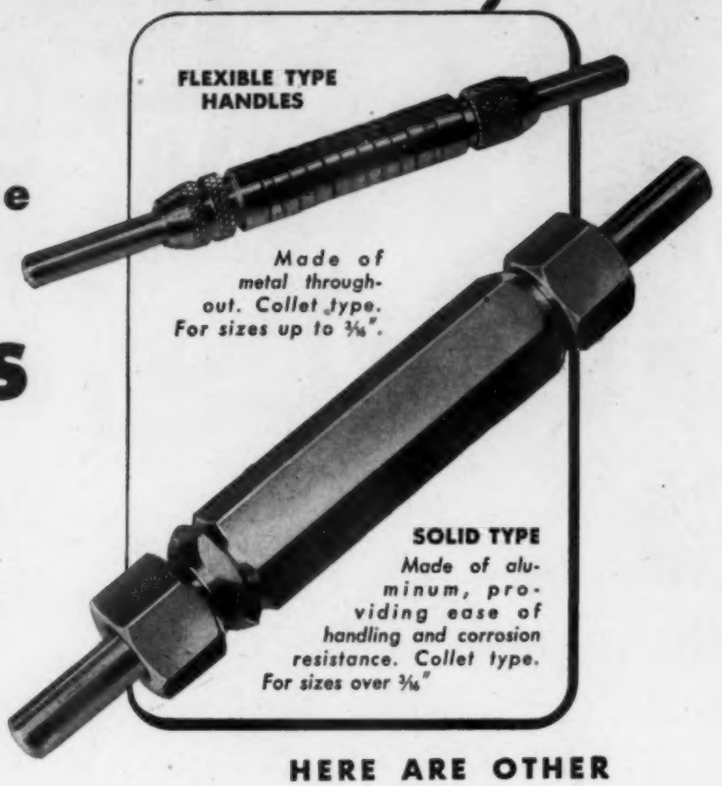
Long, Accurate Gage Life!

WITH THESE

LINCOLN PARK
Reversible Wire Type
CARBIDE PLUG GAGES


FLEXIBLE TYPE HANDLES
Made of metal throughout. Collet type. For sizes up to 3/16".
SOLID TYPE
Made of aluminum, providing ease of handling and corrosion resistance. Collet type. For sizes over 3/16"

If you use plug gages under 3/8" diameter, you owe it to yourself to compare these Lincoln Park gages—in eventual cost, lasting accuracy and practicability—with any other gages used for the same purpose.

Lincoln Park Wire Type Plug Gages made of cemented-carbide are approximately two and one-half times the price of similar gages made of steel. But the accurate service life of these gages is at least fifty times greater than can be expected of the best steel gages. In addition, wear-resistance allows users to disregard wear allowance for gage life and take advantage of full print tolerances—a feature which reduces to a minimum the rejection of parts due to inaccurate inspection.

They are available in a size range from .025" to .510", in either Class XX or X tolerances, and are supplied with all-metal handles of the types illustrated.

The Light-Weight Flexible Handle

Supplied For Sizes Up To 3/16"

. . . is an exclusive feature of Lincoln Park Reversible Wire Type Plug Gages. As illustrated, hazard of breakage of members due to accident or rough handling is greatly reduced. (For gages over 3/16", solid aluminum, collet type handles are supplied.)

HERE ARE OTHER *Unusual Advantages*

OFFERED BY THESE REVERSIBLE WIRE TYPE CARBIDE PLUG GAGES

- **High elastic limit of carbide insures against bent or deformed wires.**
- **Being non-corrosive, members will not rust in the handle or in storage.**
- **Since carbides are non-magnetic, the gages will not pick up chips or other metallic substances which might scratch work.**
- **Members are easily adjusted for length by loosening nuts in ends of handle and can be cut off as worn and reversed in handle.**

Lincoln Park INDUSTRIES, INC.

1723 FERRIS AVENUE • DETROIT 25, MICHIGAN

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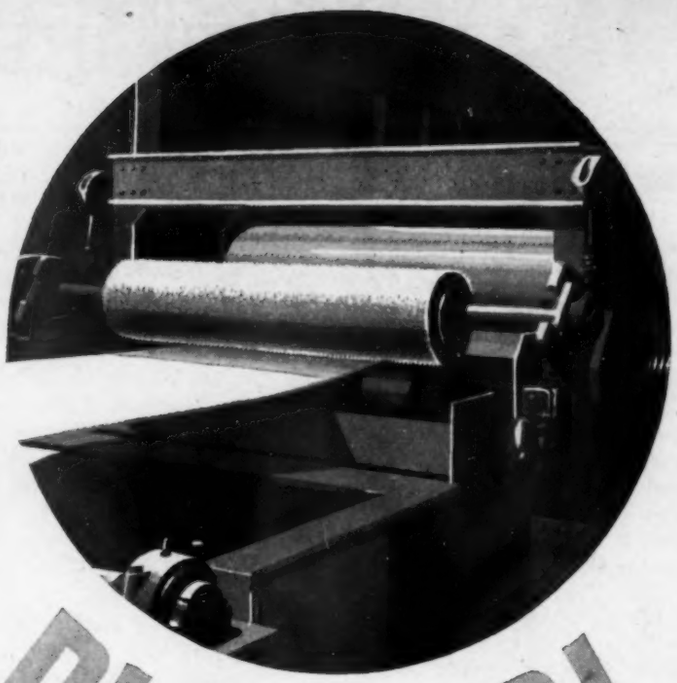
Pickled steel gets a PICK-UP!



● Stainless steel sheets pickled in nitric and sulphuric acid baths must be finished off with a hot water scrubbing. That calls for a tough brush . . . and Pittsburgh Brushes get the call from all important strip steel producers. ● Many brushes wilt quickly when contact is made with hot water-sprayed steel sheets, but Pittsburgh's dense fill of white tampico and Bahia fibre mixture, spiral wound and evenly trimed, stands up under the heaviest punishment. Fine stainless steel wire wound mandrels are also available.

Why the Pittsburgh Plate Glass Company Makes Brushes

As a leading manufacturer of paints, Pittsburgh found that a reliable source of quality brushes was necessary for the proper application of its products. For over 40 years, Pittsburgh has made its own paint brushes. It was a natural step to extend its engineering and manufacturing facilities by developing production, maintenance and power-driven brushes engineered to the specific needs of industry.

Back the All-American "Scrub Team" of Pittsburgh Brushes

● A Pittsburgh Brush does the job fast and gives you a uniformly finished product. You can depend on Pittsburgh Brushes for better performance, enduring economy, and a minimum of lost time in changeovers. In the complete Pittsburgh line are brushes of all types, including "Perfect Balance" sections, wheels and section assemblies, Uni-Fill scratch brushes, as well as paint and other maintenance brushes. ● Consult with the Pittsburgh engineering representative. He will gladly work with you in developing any type of power-driven brushes to meet your particular finishing requirements.

PITTSBURGH
PLATE GLASS COMPANY *Brush Division*
3221 FREDERICK AVENUE · BALTIMORE—29 · MARYLAND

Another New Britain Automatic with

initial and permanent accuracy

A NEW LINE OF PRECISION CONTOUR TURNING AND BORING MACHINES

Accurate and Fast — Cam and Air Actuated

Featuring **1.** An endless variety of contours or combinations may be generated with a single-point tool. Besides all the regular jobs of straight precision boring and turning, facing and chamfering, it will produce lands, recesses, flanges, steps, counterbores, and radii

2. A disc type cam for each table gives positive action consistently throughout the day — from the first to the last piece — uninfluenced by temperature changes.

3. Through positive cam action, tool approaches on rapid traverse to within .005 of the work and immediately starts to feed Tool may cut on feed-in or drawback stroke, or both for rough and finish cuts. On return stroke, tool jumps clear eliminating drag off marks. When moving between intermittent or successive cuts, tool goes into rapid traverse.

4. Uniform temperature, anti-friction bearings, and super-precision spindles provide spindle speeds up to 7,500 RPM. Mechanical precision chucking operated by air cylinders. Neither chucking nor unchucking operation affects preload or position of spindle bearings.

5. Only one dimension need be inspected on any one set-up, regardless of the number of diameters produced by any one single-point tool. Cams control and positively repeat from piece to piece.

6. Set-up of machine depends entirely upon nature of job. Work may be rotated in spindles or mounted on table, loaded from the front of the spindle or through the spindle. Spindles may be raised, lowered, or separated. Two spindles are standard, but more may be added. Changing job set-up simply requires replacing two cams, setting tool for size and changing chucks.

THREE OTHER NEW MACHINES

Latest additions to the New Britain line include: The new, faster, more powerful line of automatic screw machines designed to make the most of carbides on long and short runs, the Model 365, tool rotating, double end chucking machine — and the new line of automatic turret lathes.

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Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

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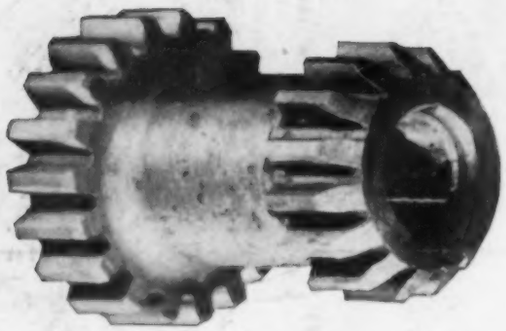
3 REASONS WHY TIMKEN ALLOY STEELS MAKE BETTER FORGINGS



1 Timken alloy steels have superior surface and internal quality. This, plus uniform forgeability, means better forgings at lower cost.

2 Timken alloy steels are tailor made to meet your specifications for chemical and physical properties by the advance melting and finishing techniques of The Timken Roller Bearing Company—world's largest producer of specialty alloy steels.

3 Uniformity in composition and response to heat treatment of Timken alloy steels assure satisfactory performance of the finished forgings.

For better, more uniform forgings at lower cost, use Timken alloy steels. Our Technical Staff will be glad to recommend the correct analysis for your requirements. Also write for our authoritative forging guide, "Evaluating the Forgeability of Steels". Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

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Fine Alloy STEEL and Seamless Tubes

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

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